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USSR Report

ENERGY

No. 78

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ELECTRIC POWER

AES CONSTRUCTION PROBLEMS, REMEDIES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Aug 81 p 2

[Article by P. Falaleyev, first deputy minister of USSR Power and Electrification: "The Energy Production Strength of the Nation"]

[Text] The basic directions adopted by the congress call for increasing electric power production by nuclear plants to 220-225 billion kilowatt-hours, achieving the growth of electric power production in the European part of the USSR mainly through nuclear and hydroelectric stations, and bringing into service 24-25 million kilowatts of new capacity at nuclear stations--by 1985.

This will make it possible, within the current five-year plan, to gain more than 70% of the total growth in electric power production from nuclear and hydroelectric stations--in the European part of the country, practically all the growth.

The tasks facing electric power workers and builders are obviously immense. But--and I especially emphasize this--they are also exceedingly complex. It will suffice to recall that, in the last five-year plan, our ministry's organizations did not fulfill the assignment respecting introduction of AES capacity.

In assessing the results of our work over the last decade we have to admit frankly that we found ourselves inadequately prepared for the wholesale erection of nuclear power stations, for which the USSR Ministry of Power and Electrification was subjected to valid criticism at the conference on nuclear power development held by the party's Central Committee in July of this year. The forces of the "Soyuzatomenergostroy" association we unfailingly increased from year to year throughout the Ninth and the Tenth Five-Year Plans. But for AES construction we always had to call on personnel who had specialized for many years in building mainly thermal power stations. And the differences in both design matters and methods of doing the work are quite substantial. Hence, the sharp drop in labor efficiency when they switched to a mode of construction that was new to them. The volume of the most arduous kinds of construction work also increased appreciably. For instance, the proportion of structures made of reinforced concrete slabs rose to 70%, which is 1.5-2 times over the same statistic for thermal stations.

We have to figure that, as a rule, we have been and we continue to be unable to more extensively employ the forces of long-constituted, well-based collectives of hydroelectric and thermal station buiders for work on nuclear station construction.

They, likewise, are burdened to the limit in their own areas of activity--far from always on electric power projects, but invariably important and top-priority ones.

So the formation and development, to wit, of specialized units for building nuclear power stations has turned out to be a major problem for the USSR Ministry of Power and Electrification. How do we solve it?

On earlier construction projects we tried to make allowance for, and in the planning of new projects we will to a still greater degree make provision for the crucial need for advance development of a strong industrial base, living accommodations and social, cultural and domestic service facilities. Herein lies the basis for establishing a vigorous and qualified force of builders and mechanics. By virtue of their specific nature, you see, nuclear stations are isolated, quite distant from built-up, populated locales. Hence, the builders of nuclear stations have to start everything from scratch.

For example, at the Chernobyl'skaya station, in order to set up a reliable and competent general contracting organization--and that's 7000 specialists!--"Soyuzatomenergostroy" had to erect 200,000 square meters of living space for their collectives alone, plus a proper complement of social, cultural and service facilities. All of the units sent here were organized and trained during the construction of the station's first section. Thus emerged a new, highly qualified and technically equipped body which, practically by itself, created needed living conditions in an inhospitable place. During the 10th Five-Year Plan the formation of collectives continued satisfactorily and stories went up in the nuclear power workers' settlements at the Rovenskaya, Kalininskaya, Yuzhno-Ukrainskaya, Khmel'nitskaya and Krymskaya stations. We must amplify that experience.

But it's not enough just to create the living conditions for a collective. There is also the need to organize so as to achieve the maximum efficiency of labor, substantially improve the utilization of equipment and transport available to the project, and eliminate or sharply curtail worker and equipment idle time which, in many instances, occurs because of deficiencies in work organization.

For our part, we must confess that the specific labor inputs on AES construction are as yet still too big. In the last five-year plan they amounted to 5-6 man-days for every kilowatt of the capacities placed in operation, which is more than double the figure for the large, modern state regional electric power stations. As a result, it was necessary to concentrate up to 10,000 or more men at the AES construction sites, stripping other construction projects of course. In the 10th Five-Year Plan, when we were putting in one or two nuclear power units a year, this arrangement was a helpful one on more than one occasion. But in the case of mass construction it is impossible.

One of the first and most important steps in solving this problem should be a shift to flow-line construction of groups of series industrial AES's with "VVER-1000" power units. The unified design and technology, by our specialists' calculations, in the years immediately ahead, in the Ukraine alone, will help reduce labor inputs by more than 5 million man days and help produce not less than 50 billion kilowatt-hours more of electric power. Let me elucidate: The figures I just gave you equal, respectively, the annual output of a collective such as, say, "Kamgesenergostroy" [Kama Hydroelectric Power Station Construction Trust], and about 2 weeks' worth of the total generation of all of the country's power stations.

Construction has already started on the Zaporozhskaya AES--the leading station of the first line. The unified structures and assemblies of a series station will be worked out here and the technology of series construction will be tested and refined.

We hope that all of our associates will participate most actively in this experiment. We are constrained to make this appeal publicly to the machine producers and materials and structures suppliers by virtue of the fact that annoying delays and interruptions have already cropped up here in the initial stage of construction because of irregularities in the provision of materials and equipment.

Grasping the vital importance of organizing flow-line construction and, in the future, high-speed flow-line construction, we will, for our part, strive to ensure it a sound industrial base from the outset. In accordance with the unified AES plans, we will increasingly go over to the extensive use of prefabricated slab structures in erecting the main buildings. This makes it possible to increase labor productivity considerably and to reduce the number of people working at the construction site. The production of special reinforced concrete and metal structures we're converting to an industry basis at nuclear power construction combines [atomoenergostroitel'nyy kombinat (AESK)]. The first multispecialty enterprise of this type is already in operation at the Zaporozhskaya AES. Within the next few years the Kursk, Balakovskiy, Smolensk and Khmel'nitskiy combines will go into operation.

More urgently than ever, the ministry is today focussing its organizations on a systematic campaign for economy and the most rational use of material and equipment resources. But we will look at the situation in a realistic way: However effective our efforts in this direction are, they are still insufficient to fully compensate delays and interruptions in supply.

In the first year of the new five-year plan the situation improved somewhat thanks to the assistance of USSR Gossnab. But we are even now experiencing serious difficulties because of inordinately delayed filling of our orders.

Back in January of this year, the USSR Ministry of Power and Electrification refined and coordinated delivery schedules on equipment and parts for the most important underway power units with the Ministry of the Electrical Equipment Industry, the Ministry of Chemical and Petroleum Machine Building, the Ministry of Instrument Making, Automation Equipment and Control Systems and the Ministry of Heavy and Transport Machine Building. But even these schedules, which were worked out according to deadlines, are far from always maintained. Enterprises of the Ministry of Power Machine Building are especially sloppy partners for us. Very often the Belgorodskiy, Chekhov and Izhorskiy plants let the builders down. And everyone knows that flow is simply impossible with a "rhythm" like that. That's why we urgently request that orders for nuclear construction projects be given the green light they deserve.

We face a mammoth job. And there is certainly much difficulty awaiting us. But we are confident that, with the consistent attention and support of the CPSU Central Committee and the Soviet Government, the ministries and the departments, this nation-wide task--the development of nuclear power--will be successfully accomplished.

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ELECTRIC POWER

SOLAR, GEOTHERMAL, TIDAL PROJECTS DESCRIBED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 22 Jul 81 p 2

[Article by F. Sapozhnikov, deputy minister of USSR Power and Electrification: "Energetics of the Future Are Being Created Today"]

[Text] "Increase the scale of the national economy's use of renewable energy sources (hydraulic, solar, wind, geothermal)"--it is written thus in the basic directions for the economic and social development of the country during the current five-year plan and for the period ahead to 1990. There is profound significance in this brief statement. It means that the time has come to move from experiments and tests to the industrial assimilation of ecologically clean and practically inexhaustible sources of energy.

The involvement of these sources in the functioning of the economy is fully responsive to the party's adopted course toward economical and rational utilization of fuel-energy, raw-material and other forms of resources. Their application will offer the opportunity for considerable savings of natural fuel and expand the raw material base of energy production. Let's take a look at what real prospects this plan holds for the years just ahead.

We'll start with solar radiation. We have whole regions where the intensity of the sun's radiation is quite high and steady. In these areas, solar stations will be indispensable for improving the energy supply of numerous dispersed consumers, primarily rural.

Beginning in 1978, the leading scientific, planning and design organizations of the USSR Ministry of Power and Electrification embarked on the execution of a program aimed at developing the country's first experimental solar power station. Today, one can already talk about the accomplishment of the first stage of the work. USSR Gosplan and Gosstroy have approved the grounds for construction in the Crimea of a tower-type solar electric power station of 5 megawatts capacity. This was, by the way, also the capacity of the world's first nuclear electric power station at Obninsk. AES capacities now, as we know, are in the millions of kilowatts.

The Crimean solar electric power station [Russian abbreviation SES=solnechnaya elektrostantsiya] will have a 75-meter tower with a steam generator, which can be in the form of a steam boiler, and an immense mirror "field"--1600 heliostats with a total surface of 40,000 square meters. The sun's rays, caught by the heliostats, heat the water to boiling and the steam drives a turbine. That, in general terms, is the system by which the station operates.

The All-Union State Institute for the Planning of Electrical Equipment for Heat Engineering Structures is at present finishing up development of the engineering work plan for the SES-5. It is proposed to accomplish activation of the station in four units. All of the necessary technical documentation for construction of the first section has been issued. It is due to be finished in 1983.

The building of such a station is as yet a complex and expensive business. Almost none of the SES-5 equipment has analogues in our native practice. The 40,000 square meters of mirror surface have not only to reflect the sun's rays but must also "follow" the sun's movement. For that purpose the heliostats will be equipped with an automatic control system which will provide for activation in the morning and "tracking"of the luminary's movement, will turn off the heliostats if clouds cover the sky and help to "pick up" the sun when the clouds have passed.

The irreproachable execution of a so complex, unique structure requires the combined efforts of a number of ministries and departments. Unfortunately, we have here a number of still unsolved problems. It is necessary, first of all, to tune up for the mass production of inexpensive aluminum-coated mirrors.

It is possible, in this case, to make use of the experience of the Saratov VNIItekhstroysteklo [All-Union Scientific Research Institute for the Technology of Structural Glass], where there is in operation an experimental mirror production line with vacuum chambers. The USSR Ministry of the Construction Materials Industry is undertaking the manufacture of a line like it for our purposes also. But its planning and preparation require the participation of organizations of the Ministry of the Electronics Industry.

So-called step-by-step electric motors--two for each heliostat--are required for the sun-tracking system. Eight hundred of them are needed for just one unit, 2400 for the whole station. But the enterprises of the Ministry of the Electrical Equipment Industry manufacture motors of this type in very limited quantity and an increase in output is not even planned.

This seems to be a highly irregular way of doing things. It is entirely clear that it's not a matter of just one single SES-5. The technical-economic grounds for construction of an experimental industrial solar electric power station with a capacity of 300 megawatts have already been developed at the All-Union State Institute for the Planning of Electrical Equipment for Heat Engineering Structures. Many tens of thousands of step-by-step motors are needed for it. It's necessary to prepare for their production now.

It is true that solar electric power stations can not yet compete with your usual hydraulic, thermal or nuclear stations as far as technical-economic indexes are concerned. But, in fact, there were few who figured, at one time, that the AES would rise to rank with hydroelectric and thermal power stations and would rightly be termed "usual".

A fair-sized role in the energetics of the future is being accorded the use of the heat in the depths of the earth. Underground waters, taking on heat among the deep rocks and warming up to their temperature, carry a considerable amount of thermal energy to the earth's surface. Most promising in this regard is the area of Kamchatskaya Oblast where the Pauzhetskaya geothermal electric power station [Russian abbreviation GeoTES=geotermicheskaya elektrostantsiya], at 5 megawatts capacity, has been operating now for many years.

The construction of a second section of the Pauzhetskaya GeoTES was completed not long ago and the station's capacity now will more than double. The decision was made to build another one, the Mutnovskaya GeoTES, south of Petropavlovsk-Kamchatskiy. Its first section, with a capacity of 200 megawatts, is supposed to go into operation by the end of the five-year plan.

The schedule may be stalled, however, due to slowness of the geological exploration work. An industrial appraisal of reserves of the heat carrier is needed, but the workers of the "Kamchatgeologiya" association are promising to wind up the exploration no earlier than 1986.

The construction of a large geothermal electric power station is specified for the Dagestanskaya ASSR. The operations connected with its creation are opening up a new stage in the development of geothermal power engineering. So-called petrogeothermal heat--i.e., the heat accumulated by dry rock--will be used here to produce electric power by means of the establishment of underground circulation systems.

Some 20 scientific, design and planning organizations are working on the development of the Dagestanskaya GeoTES. Construction of the station at urgent pace is scheduled to start during this five-year plan. The technical-economic grounds have likewise been completed regarding the advisability of building geothermal electric power stations of 1000 megawatts in Stavropolskiy Kray and Transcarpathia. This will offer the opportunity for extensive use of the earth's heat for electric power and heat supplies over a significant area of the country.

One of the most promising and economically tangible forms of renewable energy sources is wind energy. But there are many problems to be solved on the way to developing it. The fact is that existing wind equipment is rather complex, of low reliability, and is still substantially inferior economically to the traditional sources of power.

The main thing restricting development of wind-power technology is the high cost of the hardware. The wind is free, but not the machines enabling the use of its energy. And on the agenda here, as in the case of solar stations, is the matter of bringing down the specific expenditures for building and operating the hardware.

We have regions in this country that are "rich" in wind-energy reserves: the Far North, the Aral-Caspian areas and the shores of the Baltic Sea and the Pacific Ocean. There are great prospects for the use of wind-power installations in agriculture and land improvement, particularly in the southern arid and semidesert areas. Such installations, functioning autonomously, can successfully employ main pipelines for cathodic protection. In the Far North they will make possible substantial savings of fuel which is difficult to supply and costly.

In conclusion, I want to mention one other, perhaps "exotic", electric power source, tidal electric power stations. The energy of the tides is tremendous. Its use in the European part of the nation alone can yield 40 billion kilowatt-hours a year.

The experimental Kislobugskaya tidal electric power station with 400 kilowatts capacity, built on the shore of the White Sea, has been operating for 12 years now in the USSR. The successful experience of its construction and operation has demonstrated the concrete possibility for construction of a station of this type using so-called fused structures. This means that the station edifice is erected in a maritime industrial center, then transported by water in its assembled form to the site of installation. There is thus no need to erect expensive cofferdams to protect the station's foundation area from the sea. Institutes of the USSR Ministry of Power and Electrification are currently doing research with a view to the construction of higher power tidal stations.

What position will renewable energy sources occupy in the nation's fuel-energy balance? What kind of a role will they have in the large-scale power production picture? It is as yet difficult to answer these questions conclusively. But there is no doubt about one thing: They will grow in importance because the reserves of the traditional resources of energy are not unlimited.

There was a meeting not long ago in the CPSU Central Committee on the subject of the development of nuclear power. The need to improve the nation's fuel-energy balance, to cut down on the proportion of oil in it was stressed once again. Drawing the heat of the earth's depths, the sun, and the forces of the wind and the tides into an aggregate power production "team" will contribute to solving this problem.

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ELECTRIC POWER

SOLAR, GEOTHERMAL, WIND POWER PROSPECTS EXAMINED

Moscow IZVESTIYA in Russian 14 Aug 81 p 3

[Article by Professor R. Akhmedov, doctor of technical sciences and Professor Yu. Vershinin, doctor of technical sciences: "Sun, Water, Wind May Become Inexhaustible Energy Sources"]

[Text] The proportion of fossil fuel in the structure of the USSR's fuel-energy balance exceeds 90%. The reserves of it are not unlimited. Moreover, all types of fuel are getting more expensive because of depletion of reserves in the available deposits and the shift of fuel production to little-developed eastern regions where climatic conditions are severe and mining-geological conditions are complex. The development of the fuel-energy sectors annually takes more than a third of all capital investments in industry; and if one includes the outlays for energy consumption the figure runs up to one half the capital investments. And the products from the combustion of the fuel are contaminating the air around us.

Under these conditions, seeking, developing and assimilating new, effective and ecologically clean sources of energy take on importance.

In his report to the 26th CPSU Congress, comrade L. I. Brezhnev pointed out that the quest for fundamentally new sources of energy has to be continued. The USSR State Committee for Science and Technology has worked out a long term, comprehensive, targeted program on this problem. The functions of leading organization for the program's implementation have been assigned to the State Scientific Research Institute of Power Engineering imeni G. M. Krzhizhanovskiy (ENIN) of the USSR Ministry of Power and Electrification.

Of particular interest are the so-called non-traditional, renewable energy sources (solar, geothermal and wind). The potential resources of them are many times over the reserves of all forms of fuel and their use would more than cover mankind's energy needs. But they are, unfortunately, scattered about in the space around us and in the earth's crust.

An evaluation of the true levels of possible exploitation of these sources can be made only on the basis of reliable original data obtained at large-scale experimental-industrial electric power installations.

There are two lines of effort differentiated in the utilization of the renewable energy sources: the production of low-potential heat for heating and production-technical needs, and the production of electric power.

The former lends itself most to practical development and can be put to use extensively in the near term. In the southern regions of the country where the number of hours of sunshine reaches 2000-3000 a year, solar energy can be widely used for heating, for hot water supply, for refrigeration and air conditioning, for drying agricultural products, heating greenhouses and preparing food.

There are many projects along this line. For example, an ENIN solar heating system has been put into operation at the "Sportivnaya" hotel in Simferopol. It makes possible an annual savings of up to a third on valuable gas fuel. The payoff period for such installations is no more than 3-5 years. A similar plant is in operation at the Yalta Dom byta [apartments]. In the Tashkentskaya Oblast city of Chirchik there is a residence with solar heating and solar hot water supply. "Solar houses" of varied design are being built in Uzbekistan, Turkmeniya, Tajikistan, Dagestan and the southern Ukraine.

Ample experience in the operational use of thermal waters has been accumulated in our country. In Dagestan, heat from the depths has been warming the houses of residents in the cities of Kizlyar and Izberbash for several years. The employment of natural heat is being expanded also in other cities of the Caucasus and Transcaucasus and in areas of Siberia and the Far East. Geothermal heat is finding application not only for residential heating but for greenhouses as well. The cost of the heat in this case is one third to one fourth that of traditional fuels burned for the same purposes.

The considerable resources of thermal waters in regions of Central Asia and Kazakhstan are finding very limited application as yet. The fact is that these waters contain dissolved aggressive salts and gases, which leads to the accelerated corrosion of heat supply systems. To eliminate this deficiency, ENIN associates have developed two-loop heating systems, which enables the users to get chemically pure water.

The experience accumulated here and abroad indicates that there are no fundamental obstacles to mastering the use of the aforementioned sources of heat. It is necessary to promote the planning and design work and develop the requisite production capacities for the specialized equipment and assemblies and for automation equipment. The complex nature of the problem requires the coordinated efforts of the USSR State Committee for Science and Technology, USSR Gosstroy, the USSR Ministry of Power and Electrification, and the many ministries in a position to solve the problems relating to the manufacture of assembly parts, the drilling of geothermal wells, and to the the equipment and operation of solar and geothermal heating and cooling systems.

Attractive but more problematical is the use of non-traditional, renewable sources to produce electric power.

The construction of this country's first experimental solar electric power station has been started in the settlement of Lenin in Krymskaya Oblast. The station's capacity is 5000 kilowatts. It is being built under the scientific supervision of ENIN in accordance with plans developed by the Riga division of the All-Union State Institute for the Planning of Electrical Equipment for Heat Engineering Structures. There is reason to assume that relatively inexpensive solar electric power stations will emerge as a visible prospect.

Considerable experience has been gained in the construction and operation of geothermal electric power stations (GeoTES). The total installed capacity of all the GeoTES's in the world now exceeds 2 million kilowatts. In the USSR, two small experimental stations were built and are successfully operating on Kamchatka: the Pauzhetskaya station with 11,000 kilowatts capacity and Paratunskaya with 700 kilowatts. The large Mutnovskaya GeoTES, with a capacity of 200,000 kilowatts is being built on Kamchatka now under ENIN scientific supervision.

Formations with a flowing steam and water mixture of sufficiently high temperature are found only in regions of active volcanic activity. There are relatively few such regions on earth. More promising is the application of the heat accumulated in rocks which are dry or have but slight water encroachment. In the European part of the USSR, for example, the most promising are areas with an elevated thermal gradient in Stavropol, Transcarpathia and Dagestan. Small experimental electric power installations are already under development here. Research using them will enable the collection of data for the construction of large geothermal electric power stations. There is reason to hope that, in time, such stations will be in a position to compete with thermal and nuclear electric power stations.

The energy of the wind can be put to use extensively for supplying consumers situated at a distance from power transmission lines. Future prospects for using wind energy entail increasing the unit capacity and efficiency of the wind machinery and lowering the cost of producing it.

So science has already created the prerequisites for making use of non-traditional sources of energy. The extent to which each is developed will depend not only on scientific investigations but also on how soon active measures are initiated for the practical application of the work already done.

There are no doubts whatsoever that, through the united efforts of all of the ministries and departments concerned, the tasks of assimilating new, renewable sources of energy imposed by the 26th CPSU Congress will be successfully discharged.

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ENERGY CONSERVATION

UKRAINE PREPARES TO GET COMPRESSED-GAS POWERED VEHICLES

Kiev RABOCHAYA GAZETA in Russian 27 Jun 81 p 2

[Article by L. Dolishnyaya (L'vov): "Compressed Gas Instead of Gasoline"]

[Text] Among the tasks set by the 26th CPSU Congress for workers' collectives, the saving of fuel and energy resources is one of the chief ones. The problem of liquid fuel, particularly gasoline, the requirement for which grows faster than it is produced, is especially severe. Consequently, the time has come to be concerned about the conversion of automotive transport to another, cheaper type of fuel, particularly to natural gas, of which our country has fairly great supplies.

During the current five-year plan 100,000 vehicles throughout the country as a whole--28,000 of them in our republic--will be converted to use compressed natural gas. The successful execution of this task requires the solution of a number of problems that are linked with the production and operation of gas-cylinder vehicles. An All-Union seminar that was organized at L'vov by the USSR Ministry of Automotive Industry, the UkSSR Ministry of Automotive Transport, and the UkSSR State Committee for the Supply of Petroleum Products was dedicated to a discussion of these problems.

It is not by chance that L'vov was the site of the seminar. The fact is that motor vehicles powered by compressed natural gas have been operating successfully at the city's automotive enterprises for many years, and a gas filling station is operating. The Ukraine now has two such stations, UkSSR Ministry of Automotive Transport reported to the seminar's participants. Both of them are standardized and have been designed for 500 fill-ups per day each. But today only about 400 vehicles altogether are being served. These are mainly vehicles that were produced in the 1950's and have been maintained here in fairly good condition, or those that have been reequipped on the basis of them.

As is known, Minavtoprom [Ministry of Automotive Industry] plants at one time mastered the production of gas-cylinder vehicles that operate on compressed gas. They were produced in small industrial series. However, after some time, for a number of reasons, their production was stopped, and this led to a sharp reduction in the demand for gas as an engine fuel. Now the question has arisen of reviving the operation of gas-cylinder automotive transport in the country but on a more improved technical and economic base.

It was emphasized at the seminar that both scientists and operators have much work to do toward this end. The low calorific value characteristics of gas makes engine starting difficult at low temperatures to some extent, leads to some loss of engine power, and so on. Even so, as the L'vov experience indicates, the operation of gas-cylinder motor vehicles has a number of advantages over gasoline vehicles.

At the roadbed-repair operations garage of the L'vov Railroad, 80 percent of the assigned trucks are gas-cylinder vehicles that have been operated here for about 30 years. Thanks to their use the garage saves the state more than 1,000 tons of gasoline each year. Expenses for the preventive maintenance and repair of gas-cylinder vehicles is much lower than for gasoline-powered vehicles. Gas fuel provides softer engine operation than does gasoline fuel, and that means less wear and an increase in vehicle kilometerage between repairs. But the main thing, thanks to the use of gas, is that harmful emissions are reduced by far.

The seminar's participants were able to become acquainted with gas-cylinder vehicle operating experience and also with a gas filling station directly on the spot where they visited. And what they saw here, it goes without saying, will help greatly in solving the most important state task of converting automotive transport from gasoline to compressed natural gas. Already this year, as F. P. Golovchenko said, the Ukraine should receive the first 100 gas-cylinder vehicles, and next year 5,000.

Consequently, it becomes necessary to speed up the development of a network of gas filling stations--stationary and mobile, the training of personnel who can tend them, the production of the appropriate equipment, and so on.

The thoughts and suggestions expressed by the seminar participants formed the basis for appropriate recommendations.

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ENERGY CONSERVATION

POTENTIAL FOR FUEL SAVINGS BY WASTE-HEAT RECOVERY ANALYZED

Moscow IZVESTIYA in Russian 27 Jun 81 p 3

[Article by A. Dykhno, deputy director of the All-Union Scientific-Research and Design-Development Institute for Industrial Power Engineering (VNIPIenergoprom): "'Cold' Heat"]

[Text] Each year industrial and agricultural production increases in the country and the populace's housing conditions are being improved. These require an increase in the consumption of fuel and energy. But fuel reserves are not limitless, and the extraction and transporting of fuel and energy to the places of consumption are expensive. A thrifty attitude toward the expenditure of fuel and power resources and economizing on their expenditure are nationwide goals. The 26th CPSU Congress pointed out a specific guidepost to achieve in 1985—a saving of 160-170 million tons of standard fuel equivalent over 1980. The efforts of many scientific-research, design and trouble-shooting organizations and enterprises of all branches of the national economy are aimed at solving this task.

One of the main trends of development in the area of saving energy is the use of low-potential (that is, heated to 20-50 degrees) heat discharged from production facilities. These include primarily heat from ventilation exhausts of industrial buildings and departments and the low-heat effluent of enterprises.

Numerous investigations that our institute's specialists have conducted, with the participation of inspectorates of Gosenergonadzor [State Inspection of Industrial Power Engineering and Power-Engineering Supervision] and of industrial organizations indicate that very little attention has been paid yet to the use of low-potential heat. The decree, "On the Initiative of the Collectives of Some Enterprises of Moscow City to Make Wide Use of the Achievements of Science and Technology with a View to Providing for Savings of Labor, Material and Power Resources," which was adopted by the CPSU Central Committee, is also attracting attention to this source of possible fuel savings.

For various types of premises (apartment houses, cinemas, hospitals and so on), the share of heat spent on ventilation thereof is 40-60 percent of all the heat expended. Even partial use of the heat of exhaust air yields a large fuel savings, since expenditures for "fresh" heat can, in this case, be cut by at least half. At Moscow machinebuilding enterprises, for example, possible fuel savings from this source are assessed at more than 200,000 tons per year.

Simplest of all, heat expended for ventilation can be reduced (where sanitary and hygienic demands permit) by an arrangement for recirculation--mixing air that has been removed from the premises with influent air.

Influent air can be heated up by ventilation-heat discharges in various heat-exchange devices. A number of organizations in our country are doing work in this area, and this problem is being tackled strenuously abroad.

Polotsk's Casting-Machinery Plant Association has mastered the series production of a plastic heat exchanger that can heat up to 4,000 cubic meters of air per hour. A heat exchanger of higher capacity is being demonstrated now at the VDNKh [Exhibition of Achievements of the National Economy of the USSR]. The use of one such device will enable about 40 tons of fuel to be saved annually.

Where there are no rigid restrictions on air purity, the wide use of rotating-drum heat-exchangers of the so-called regenerative type is possible. Such an installation of the RT-2 type, with a productivity of 20,000 cubic meters of air per hour, has been checked in the environment of the ZIL [Motor-Vehicle Plant imeni I. A. Likhachev] Production Association. Designs for heat-recovery units and for ventilating installations of lesser capacity have been created.

Various technical solutions for the use of ventilation-discharge heat have their areas of rational application. Therefore, it is necessary not only to promote further research and experimental-design work in this area but also to strengthen the coordination thereof in order to avoid duplication and dispersion of effort and resources. But the main thing is that it is necessary to build up the production volume of such recovery units and to introduce them widely.

It is impossible in most cases to use directly the heat of the mildly heated water that enterprises discharge. It is necessary to raise its potential, in order words, to raise its temperature. This problem can be solved by means of so-called heat pumps. Ideas about the creation of such pumps were worked out in the 1920's. The operating principle of the heat pump is not complicated. A low-boiling point substance--freon, while cooling mildly heated water in a heat exchanger, is turned into steam. Then the freon's steam is subjected to compression in a compressor; in so doing, it is warmed up and it enters a second heat exchanger--a condenser. Here the freon gives off its heat to water, but now at a substantially higher temperature (60-100 degrees C). In this cycle, the expenditure of energy at the compressor drive is a small fraction of the energy that is extracted from the low-potential mildly heated heat source.

The total installed power of heat-pump installations in the world still does not exceed 100,000 kilowatts. It is expected that by the year 2000 this power will grow more than 1,000-fold.

In the USSR there are still only a few heat pumps (TNU's), which have been created on the basis of serially produced cooling machines. At the Simferopol' electric-power substation, such an installation with 30 kilowatts of power is heating production premises, and in the city of Samtredia a TNU of 1,000 kilowatts' power is being used to dry tea leaves. Starting-up and setting up work has been done on a high-powered installation in Nurek that is intended for supplying apartment houses with hot water.

A considerable saving of fuel can be obtained by creating large heat-pump stations for centralized heat supply. This will provide a fuel saving of 20-30 percent over traditional heating boilers.

Our institute recently finished the development of a feasibility study of a heat-pump station in Moscow that would use waste heat of the Lyubertsy Aeration Station. Calculations indicated that this installation will enable up to 7,000 tons of fuel to be saved each year and atmospheric pollution by harmful discharges to be greatly reduced. Technical solutions for a number of heat-pump installations for industrial enterprises were worked out jointly with institutes of Minkhimprom [Ministry of Chemical Industry], Minbumprom [Ministry of Pulp and Paper Industry] and USSR Minchermet [Ministry of Ferrous Metallurgy].

We have also developed heat pumps that were based upon the principle of the thermoelectric effect (the occurrence of a difference in temperature during the passage of a direct electric current through a semiconductor circuit). Change in direction of the current transforms such a heat pump into a cooling unit which creates, for example, the desired temperature in rooms during the summer. These devices are desirable to use for decentralized heating and cooling supply. It should be noted that they can use heat that is discharged not only by water but also by ventilated air.

The possible saving of fuel from the use of mildly heated discharge water by means of heat pumps is computed at hundreds of thousands of tons per year in the long term.

Thus, low-potential heat discharge is a substantial reserve for saving fuel. It must be used in concert with measures for carrying out the recently adopted CPSU Central Committee and USSR Council of Ministers decree, "On the Main Areas and Measures for Raising the Utilization Effectiveness of Fuel and Energy Resources in the National Economy During 1981-1985 and During the Period up to 1990." Many organizational and technical problems remain to be solved. Including one of the important ones--arranging for the production of experimental prototype models of heat-recovery equipment and comprehensive checking thereof, and large-scale output of the equipment.

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ENERGY CONSERVATION

TASHKENT'S LIQUEFIED-GAS POWERED TAXIS EXPERIENCE SUPPORT DIFFICULTIES

Moscow PRAVDA in Russian 4 Aug 81 p 2

[Article by Kh. Ibragimov, Director of Taxicab Fleet No 3, and S. Saidkasymov, manager of the Laboratory for the Reliability of Gas-Cylinder Vehicles of the NPO Uzavtotranstekhnika [Uzbek Science and Production Association for Motor-Vehicle Transport Technology] and candidate of engineering sciences (Tashkent): "Let the Taxis Be Nontoxic"]

[Text] Earnest study is being devoted to more economical automotive fuel today. The country's fleet of vehicles is growing, so even a relatively small yield promises great economic benefit. Research is being performed in many areas. One of them is the conversion of motor vehicles to liquefied propane-butane gas.

Our Taxicab Fleet No 3, for the first time in the country, began large-scale operation of taxicabs that operate on a propane-butane mixture.

Taxis work around the clock, so they pollute the atmosphere with exhaust gases more than other cars. Meanwhile, the use of gas-type fuel will enable toxicity to be reduced by two-thirds to four-fifths. The wide introduction of taxicabs with gas cylinders will enable the air basins of cities to be cleaned up.

Our taxi fleet operates the GAZ-2407 gas-cylinder car. Outwardly this is a Volga that has, along with a gasoline tank, a gas cylinder of 84-liter capacity. The kilometerage reserve with a full tank is 450-500 kilometers in city traffic.

Gas-cylinder cabs are not only less harmful to the environment, they also yield a solid economic advantage. Liquefied gas is cheaper than gasoline. Just by reducing fuel expenditures the fleet saves 240 rubles per year per vehicle. At first glance, the sum is not very large. But if it is considered that in Tashkent alone there are 3,500 cabs, then the sum obtained will be very impressive if all these vehicles are converted to gas. And if this is done nationwide?

Right now 142 vehicles out of 750 in the taxi fleet have been converted to gas. We planned to convert completely to the "blue fuel" during the 11th Five-Year Plan. However, the Gor'kiy Motor-Vehicle Plant is not fulfilling the plan for delivery of gas-cylinder cars to Uzbekistan's Minavtotrans [Ministry of Automotive Transportation]. In the first half of the year we should have received 50 vehicles but got only 13. The Gor'kyites explain the shortfalls by the fact that the Ryazan' Automotive Equipment Plant has not arranged for the serial production of evaporator-regulators for the cars. The spare parts problem for the gas equipment also is severe.

An agreement about scientific and technical collaboration has been concluded among Taxicab Fleet No 3, the Gor'kiy Motor-Vehicle Plant and the Transvolga Motor Plant imeni 50-Letiya SSSR. In accordance therewith, the plant's workers should increase the reliability of the gas equipment and the engine and help us in the fabrication and introduction of accessories and equipment for servicing and repairing gas-powered motor vehicles. But these commitments still are being carried out poorly.

The UzSSR Ministry of Automotive Transport, in accordance with the agreement, has organized a scientific-research laboratory for gas-cylinder vehicle reliability on the basis of Taxicab Fleet No 3. Extensive statistics have been assembled about the reliability of the parts for the gas equipment and of other vehicle components and assemblies. Recommendations have been prepared, based upon operating results. However, they are being introduced only slowly.

Right now preparations are going on at the Gor'kiy Motor-Vehicle Plant for the large-scale manufacture of a new modification of the GAZ 31027 gas-cylinder car, on which equipment used on the GAZ-2407 has been installed. So, in our view, it is sensible to check this vehicle under realistic conditions right now.

Other problems also require attention. For example, standard designs for garages for the storage, repair and technical servicing of gas-cylinder vehicles are still lacking. The development of such a design and of papers for rebuilding existing enterprises for gas-cylinder car operation should be assigned to Giproavtotrans [State Institute for the Design of Automotive Repair and Transport Enterprises and Structures].

The propane-butane mix that is being used has high gumminess. The design of a filter for cleaning the gas needs improvement. Since the gas in its pure form does not have an odor for detecting leaks, it is "tinted" with a special additive. Because of imperfection of the system for forming the mixture, the additive does not burn completely in the engine. Moreover, the exhaust pipe of a gas-cylinder car remains the same as on the Volga with a gasoline engine. Spent gases remain for a long time in the swirl zone, so during idling and when the car is stopped, specific unpleasant odors penetrate the car body proper through the baggage compartment.

There is as yet in Tashkent one gas filling station, at which both cars and truck are fueled. Lines build up at the station, but on Sundays it is generally closed, since preventive maintenance is being performed. Therefore, on Sunday the gas-cylinder taxis are compelled to use gasoline. Is this economical? Still another station must be built in Tashkent, or the mobile gas-refueling station produced by Kuzpolimermash must be allocated to the taxi fleet.

The conversion of motor vehicles to gas-type fuel is a matter of great importance. The green light should be turned on for such taxicabs.

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POTENTIAL FOR WIDER USE OF AZERBAIJAN'S GEOTHERMAL WATER ASSESSED

Baku BAKINSKIY RABOCHIY in Russian 14 Aug 81 p 3

[Article by A. Askerov, manager of the Department of General Geology and Hydrogeology of the Azerbaijan State University, doctor of geological sciences and professor: "The Earth's Deep Heat and the Potential for Using It"; passages enclosed in slantlines printed in boldface]

[Text] Thousands of natural springs and drilled wells, which are scattered throughout Azerbaijan's whole territory, pour out enormous amounts of hot water each day from the earth to the surface. These carriers of the planet's deep heat are called geothermal water (in Greek "ge" is the earth and "terme" is heat). Unfortunately, these waters are not being used in the republic's economy.

It is comforting that the 26th CPSU Congress, after focusing the entire country's attention on the most urgent fuel and energy problems, included in "The Main Directions for the Economic and Social Development of the USSR During 1981-1985 and for the Period up to 1990," the directive: "increase the scale of use of renewable sources (hydraulic, solar, wind and geothermal) in the national economy." /Consequently, the attitude toward Azerbaijan's geothermal resources should be decisively changed./

World practice has shown that underground water with temperatures of more than 90 degrees Celsius is being used for generating electricity at geothermal stations, water of at least 50 degrees is required for the district heating of premises, and of at least 40 degrees for heating hotbeds. This inexpensive "fuel" is being employed at livestock and poultry departments of farms, in tea and tobacco driers, and in a number of technical processes in industry. Among the countries that are using hot water and superheated steam that come from the ground, Bulgaria, Iceland, Italy, New Zealand and the USA can be named. In Iceland, a northern region with a severe climate, such exotic fruits as bananas and citrus fruit are being grown successfully.

The USSR's first geothermal electric-power station has been operating on Kamchatka for 15 years now. At the beginning of this year its second phase was started up. Prime generation costs per kilowatt-hour here do not exceed 3.9 kopecks, while they cost 15-17 kopecks at diesel electric-power stations of this same region.

The first steps toward the use of thermal waters in heating services are being taken in Dagestan, Georgia, Krasnodarskiy Kray, the North Caucasus and Kamchatka.

Thanks to them, the production of a quintal of vegetables costs half as much as at hothouses that use mineral fuel. Expenditures for construction are repaid in 2-3 years.

Good experience has been built up in the Dagestanskaya ASSR. Thermal water is supplying 12 percent of the population of Makhachkala and half the residents of Izerbash and Kizlyar with heating and a hot-water supply. Special wells for obtaining thermal water are being sunk on the outskirts of Makhachkala and other geographical points of the autonomous republic. The Institute of Geothermal Problems is at work within the Dagestan Branch of the USSR Academy of Sciences.

District heating has been installed to satisfy the municipal and personal-amenity needs of various parts of the Georgian cities of Tbilisi and Zugdidi.

/Azerbaijan is exceptionally rich in thermal water. Of the more than 1,000 mineral springs, about half yield hot water (33-82 degrees). At Apsheron Peninsula oilfields, several thousand wells 300-2,500 meters deep are giving off water with temperatures of 40-95 degrees, and sometimes even more./

The scientists have delineated eight hydrothermal zones in our republic: Talysh, Apsheron, Babazanan, Kura, Yelisu-Khaltan, Istisu-Ilyksu, Nakhichevan' and Siazan'-Khudat. /It would possible to recover here daily water whose heat (40-120 degrees) is equivalent to the energy that is contained in approxi ately 1 million tons of standard fuel equivalent./ In regions of the central part of the Lesser Caucasus and the Nakhichevan' uplands are springs of carbonic-acid waters--Istisu, Darrydag, Sirab and other places--that are of medicinal value. /And still it is more desirable to use fields in the lowlands and the foothill regions and on the Apsheron Peninsula, that is, more than 90 percent of the total amount of thermal water of Azerbaijan, for heat and power needs./

The Talysh and its many natural underground water (42-64 degrees) outlets in the Astara, Massaly and Lenkoran' regions should play a special role. The springs have high flow rates. The Talysh supplies early vegetables to the republic's population and to the country's industrial centers. This is why an abundance of thermal water will enable the problem to be posed of creating several large hothouse combines capable of growing vegetables and other foodstuffs the year around. Such farms will increase Azerbaijan's contribution to execution of the foodstuffs program.

The hydrothermal resources of the Apsheron Peninsula are extremely dependable. In Kala, Surakhany and other areas, formation waters with temperatures close to the boiling point are obtained. More than 100 wells give 50-300 tons of hot water per day each, some of them 10,000 tons per day. Lokbatan, Puta, Karadag, Kushkhana and the environs of mud volcanoes are promising.

It is of importance that mastery of the earth's deep heat is possible in many branches of Baku's economy. These are the extraction of iodine, bromine, naphthenic acid, soda and other chemicals, the generation of electricity, the growing of vegetables the year around, and the district heating for microrayons and settlements, municipal enterprises, swimming pools and so on.

The 26th CPSU Congress assigned Azerbaijan the task of stabilizing oil recovery. The use of new methods for stimulating formations in order to increase the flow of crude will be expanded. During the 11th Five-Year Plan the magnitude of the introduction of thermal methods, including the injection of hot water and steam, will grow at the oilfields. The use of thermal waters for this purpose could reduce expenditures of liquid and gaseous fuel for the operation of steam-generating installations.

It is necessary to account for all wells with hot water, to analyze the geological documentation about those that are within Azneft' [State Association of the Azerbaijan Oil Industry] and its oil and gas recovery administrations, and to develop recommendations on the rational use of hydrothermal resources in various branches of the economy.

Talysh and Apsheron should become primary targets. Their experience will be of service in the later economic assimilation of the earth's heat in other regions of the republic. Large deposits of thermal waters have been observed during drilling in the Kura-Araks lowland. The waters of the Yelisu-Khaltan region are suitable for supplying heat.

In our time, the economic desirability of bringing renewable energy sources, including geothermal energy, into economic circulation has increased. Azerbaijan has the scientific forces, qualified specialists and skilled drilling foremen. Genuine motivation on the part of planning and economic organs to solve the problems of mastering the republic's hydrothermal riches is necessary. A science-and-production conference must be prepared for and held in the near future, with the participation of Gosplan, ministries, agencies and institutes. It is necessary to begin this important promising matter with the development of scientific substantiation of an integrated program for maximum utilization of the earth's deep heat.

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ENERGY CONSERVATION

BRIEFS

ELECTRIC-HEAT RADIATOR CREATED--The Film Electric-Heating Laboratory of the Belorussian Institute for the Mechanization of Agriculture has created a self-regulating electrical heating radiator. It is desirable that it be manufactured on the basis of the serially produced MZ-500 type steel heating radiators. The use of this heating radiator in the heating systems of administrative and production premises will enable capital investment to be reduced by 30-35 percent. The economic benefit from introducing the innovation will be 138.6 rubles per installation for the heating of domestic or production premises 25 square meters in area. [Text] [Moscow SOVETSKAYA BELORUSSIA in Russian 27 Jun 81 p 2] 11409

AZERBAIJAN GRID SAVES ELECTRICITY--Workers of the Ali-Bayramly Electric-Power Grid have recorded more than 30,000 rubles in savings and 1 million kilowatt-hours of saved electricity in their report since the start of the year. An active creative search for production reserves helped the suppliers of electricity to reduce losses of electricity by 0.22 percent below the norms during distribution and consumption. For example, rationalizers' suggestions by foremen Akhmedagi Akhmedov, Ali Abdullayev and Aleksandr Letuskiy enabled an additional 650,000 kilowatt-hours of electricity to be returned to the grid and prime operating costs for distribution to be reduced by 3,500 rubles. In all, 22 rationalizers' suggestions and engineering measures were introduced here, which helped greatly to improve the supply of electricity to activities of the city of Ali-Bayramly and the rayons of Saatlinskiy and Sabirabadskiy and to put new capacity for the watering of agricultural lands into operation. [K. Mikailov, engineer of the Ali-Bayramly Electric-Power Grid] [Text] [Baku VYSHKA in Russian 19 Jul 81 p 1] 11409

POWER WORKERS' INCENTIVE FUNDS--The office of the Interagency Commission under USSR Gosplan on Questions of Using New Methods for Planning and Economic Incentives has adopted a USSR Minenergo [Ministry of Power and Electrification] recommendation that 1981-1985 incentive funds for electricity be formed in accordance with the standards that have been established, in kopecks per ruble of profit, and that cover an incentive for the production and economic activity of power-engineering enterprises and other branches of industry of the ministry. The Standard-Practices Instructions for Forming Incentive Funds in USSR Minenergo (by industry) for 1981-1985 that were presented by USSR Minenergo and workers of the MVK [Interagency Commission] group under the USSR Gosplan Section for Power and Electrification have been approved. The standards for forming the fund for social and cultural measures and housing construction are established by year of the five-year plan in percents of the material-incentive fund, taking into account the funds specified for these purposes in the five-year plan. In so doing, the increased demand for the fund's resources in connection with the assimilation of large fuel and power complexes in new regions of Siberia and Kazakhstan, and also the increase in expenditures for the upkeep of cultural and personal-amenity facilities in housing settlements at nuclear-power stations, are considered. It was also considered that USSR Minenergo will transmit to subordinate associations and enterprises, along with the control figures for fund-forming indicators for 1981-1985, the appropriate standards for forming economic incentive funds that are used at the stage of development of the five-year plan. USSR TsU [Central Statistical Administration] jointly recommended, with USSR Minenergo, that appropriate forms of statistical reporting for accounting for the service coefficient of the installed power equipment be called for. [Text] [Baku VYSHKA in Russian 19 Jul 81 p 1] 11409

CHEREPOVETS HEAT-RECOVERY BOILER--Cherepovets--The thermoelectric power station that has gone into operation at the Cherepovets Metallurgical Plant is generating power without any fuel expenditures. Its turbines bring into action steam that is obtained by using secondary energy sources. The station's productivity is more than 80 million kilowatt-hours of energy per year. The glowing coke received at the battery previously had been quenched with water. So pillars of steam escaped into the sky, carrying away an enormous amount of heat and fine coke particles. Conversion to dry quenching raised the coke's strength, which is important for blast-furnace workers, and precluded pollution of the atmosphere and heat loss. Coke is now cooled off in special installations in an inert-gas medium. It gives off all its heat to heat-recovery boilers, which generate high-pressure steam. Part of this steam goes to the industrial needs of the departments, but the rest of it, the surplus, still has not found application. Therefore, an electric-power station with two turbines, which bring this surplus steam into action has been created. Thanks to the use of secondary energy resources, Cherepovets's metallurgists have saved more than a million tons of standard fuel equivalent. [Text] [Baku VYSHKA in Russian 29 Aug 81 p 2] 11409

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FUELS

SHALE OIL INDUSTRY DEVELOPMENT IN ESTONIA

Tallinn RAHVA HAAL in Estonian 10 Jul 81 p 2

[Article by Ivar Rooks, department chairman of the technical department of the Oil Shale Production Collective im. V. I. Lenin: "Weighing the Perspectives of the Oil Shale Chemical Industry"]

[Text] During the last days of the past year the construction of a thousand ton gas generator was completed at the Kohtla-Jarve Oil Shale Chemical Production Collective im. V. I. Lenin. After a long interval a qualitatively totally new distilling mechanism was implanted in our oil shale industry.

After 1951 when the previously largest,5th gas generator station came on line, through three long decades our production collective as well as the Kivioli Oil Shale Chemistry Plant were primarily concerned with perfecting existing gas generators. The startup of a dry fuel, 500 ton apparatus in Kivioli in 1962 was a step forward, but the situation did not change materially at all. Thanks to retrofitting and the perfection of technology, the productivity of all gas generators was raised during this period from 1.5 to 2 times; the loading of the gas generators was mechanized; a computer was entrusted with managing the technological processes of one gas generating station, etc. All this had a great economic impact and enabled us to raise productivity several times. But from year to year the possibilities of perfecting existing installations have decreased.

The first work period of the 1000-ton gas generator lasted 2.5 months. At first the plant was loaded with 600 to 700 tons of oil shale per day instead of the planned 1,000 tons, and this was sufficient for the beginning. However, during the first work period several shortcomings were discovered. Some shortcomings can be ascribed to the limited experiences of the construction workers, because this was the first independently planned oil shale processing plant for the planning and construction department of the production collective, and there was nobody to ask for advice. Other shortcomings can be blamed on the technicians who had not thought out the innovations. In any case, the shortcomings that became apparent in the first work period of the large plant were not substantial. The builders, technicians, and plant personnel are convinced that in the near future the plant will reach its projected capacity.

The implementation of a 1,000 ton generator can hardly be overestimated from the viewpoint of progress in technology, but--600 small, 50-70 ton gas generators and some hearths are still functioning. The depreciated machinery and unproductive plants must be replaced. But one must remember that the 1,000 ton generator was built by the production collective from its own resources; help from a specialized installation organization was only intermittent. The further retrofitting of oil shale production must occur more rapidly.

The construction of modern oil shale plants is labor intensive, requiring the combined efforts of planners and builders—as was done during the construction of the compound fertilizer plant. For at the same time that large gas generators are built, one also needs a powerful condensation system, mechanized oil shale storage areas, transport galleries, hydraulic facilities for removing ash, dumps, increased maintenance, etc. Problems associated with constructing large-scale machinery and plants must be solved.

The most efficient solution to the technological retrofitting of oil shale processing in our enterprise would be the construction of a new production complex with a capacity of at least 3 million tons of oil shale per year. This would guarantee a high speed of construction and implementation of the machinery. Three million tons of oil shale are transformed in the gas generators into half a million tons of crude oil, the basic product; the byproduct, gas, is used as a fuel for the plant. This amount of crude oil could produce goods worth 40 million rubles, including 170,000 tons of creosote, 100,000 tons of a compound to reduce soil erosion, 90,000 tons of fuel oil, 50,000 tons of coke and 15,000 tons of oil to restore rubber, etc. In combination with imported raw materials, it is possible to produce another 15 million rubles' worth of goods, including 3,600 tons of epoxy resin, 1,500 tons of sealing waxes, etc.

Some of the preparation for the changes in oil shale processing have been made. The Lengiproeftekhim Institute and the Institute for Scientific Research of Oil Shale compiled a rationale for the technological-economic development of the production collective, and this has been presented for inspection to the USSR Ministry the Petroleum Refining and Petrochemical Industry.

Looking at the further perspectives of the oil shale processing industry, one must state that the 1,000 ton gas generator cannot be called a perfect refining apparatus, since the intensity of the technological process is fairly low, the organic materials are not used completely and byproducts are not being used completely. The same holds true for the solid fuel refining plant. The basic component--a revolving reactor--has a simple construction, and the process itself takes place without complications in a mixture of hot ashes and dry crushed oil shale. The other components, however, are not sufficiently reliable and cause the process to break down often. Thus the average on-line time for the dry fuel component is quite a bit lower than that of the gas generators. The dry fuel plant built for the Estonian Power Plant has also exhibited deficiencies that require additional expenditures.

Currently there is little attention paid to the problems of developing the oil shale industry in our republic--the Institute for the Scientific Research of Oil Shale is not enough. The plans of the institutes of Estonian SSR Academy of Sciences do not contain as many topics relating to oil shale as they should. Criticism levied at the oil shale industry, for example, about the low utilization of the ashes of the solid fuel plant, is justified, but little use can be made of merely pointing out shortcomings. Instead, there should be joint specific efforts to solve these problems (those known at any rate).

In the interest of further progress of a comprehensive processing of the basic resource of our republic, it is necessary to develop and expand the Institute for the Scientific Research of Oil Shale and to recruit scientists of other local institutes to research and implement new processes in the oil shale chemical industry.

The importance of solid fuel is increasing in the world. Foreign engineers and businessmen are visiting our oil shale industry plants more and more. Currently we have something to show them. Everything within our power must be done to assure that the leadership in the field of oil shale processing remains firmly in the hands of Soviet engineers and scientists.

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OIL SHALE DEVELOPMENT PROSPECTS

Tallinn RAHVA HAAL in Estonian 24 Jul 81 p 3

[Article by ETA correspondent J. Kapov: "Oil Shale Chemistry Development Prospects"]

[Text] Kohtla-Jarve--In the Oil Shale Institute of Kohtla-Jarve, the technical and economical council of the Soyuslantsepererabotka industry collective of the USSR Petroleum Refining and Petrochemical Industry Ministry held an expanded session. Perspectives for retrofitting oil shale processing industry were discussed.

R. Joonas, deputy director of the Oil Shale Institute for scientific matters, spoke about the basic trends of the oil shale industry until 1990. The main component in the further perfection of oil shale processing will lie in the construction of large gas generators. These will be built to complement the functioning main plant. At the same time the institute deals with questions concerning environmental protection: a design has been prepared to process oil shale with air cooling taking the place of water cooling. An important task in the processing of oil shale is constructing plants capable of processing fine grain oil shale. Recommendations for developing the oil shale industry further were compiled.

V. Boikov, a high official of the CPSU Central Committee, took part in the council meeting, as did V. Machin, director of the All-Soviet Oil Shale Processing collective, scientists and production workers.

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CONVERSION TO SHALE-OIL FUEL, GASIFICATION

Tallinn RAHVA HAAL in Estonian 4 Aug 81 p 2

[Article by Mart Motus, sector chief of the Institute of Thermophysics and Electrophysics, candidate of technology: "Problems of Fuel and Energy Management in Our Republic"]

> [Text] The press lately reported on the directive of the CPSU Central Committee and the USSR Council of Ministers on "Economizing raw materials, fuel, energy and other material resources, and the intensification of work relating to efficiency in these fields."
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> The directive states that the processing of raw materials and fuel is becoming more expensive, while the mines are not inexhaustible. In this situation the most economic and efficient use of all material resources becomes an especially important factor in the national economy.
>
> The directive states that the principles of socialist management must be implemented even more consistently and directly to meet Lenin's guiding idea, i.e. to manage economically and to use raw materials and products sparingly.
>
> The same directive points out the need to pay more attention to developing techniques to more effectively use material resources to create and implement techniques and technology for solving problems connected with these steps.
>
> Below are some remarks regarding the fuel and energy economy problems and ways to solve them.

The development of the national economy of our country demands a basic change in the structure of fuel usage. The limitation of crude oil resources and the ever more difficult geological and climatical conditions in the exploration areas cause a steady increase in oil production costs and require a steady increase in monetary and material means to preserve the incremental increase of production in that branch of the national economy. The increasing scarcity of oil and oil products requires an ever-wider usage of coal and natural gas and an increase in the part played by local fuel resources. Areas poor in energy resources must establish nuclear production facilities; other areas must use dry fuel, i.e. coal. Even now under certain conditions, using electrical energy for heat production is becoming an efficient method in agriculture, since electricity is produced from relatively cheap materials.

In the restructuring of fuel management in our country, the most important problem is increasing efficient, rational, and economic fuel usage. We must reach the point where each enterprise implements a program for the conservation of fuel, electricity, and heat. A scientific-practical conference regarding basic fuel and energy problems in the Estonian SSR, held early this year at the Estonian Electrical Station, found that we have to develop a scientifically justified program to increase energy effectiveness in the national economy. The republic's comprehensive program of oil shale use can serve as an example.

Research at the Institute of Thermophysics and Electrophysics of the Estonian SSR's Academy of Sciences shows that the basic means of fuel economy in our republic are an improvement in the fuel usage structure and an increase in the use factor of fuel. Due to the fuel oil shortage, the use of heavy heating oil must be decreased considerably. But fuel usage in the republic is increasing inexorably. Research has shown that the part played by natural gas in the fuel balance must be increased. This would result in saving 420,000 tons of fuel annually on the basis of 1990 production levels.

At the same time increased gasification of the republic will considerably increase fuel efficiency, since the step is from a low quality fuel to a high quality one. But this requires adaptations to the fuel management of the plants; economizers, preheaters, automatic regulators and control measurements, etc. must be installed. Based on 1990 production levels, an additional savings of 450,000 tons would result annually.

In the housing-communal industry great economies can be achieved through the use of new construction materials such as three-layered concrete panels, triple paned window panels and window glass coated with lead oxide. There is also a need to construct mass-produced housing units with ceilings, to place valves on heating units, and to install individual meters on hot water supply lines. Calculations show that the use of new construction materials would save 405,000 Goal fuel energy or 90,000 tons of fuel annually in our republic, based on 1990 production levels.

A renovation of production in industrial plants (except for electricity plants), the introduction of automation, the reduction of heat losses, a strict regime in the heating of production facilities after operating hours, the implementation of centralized heat supply and an ordering of the storage of fuel can result in saving 45,000 tons annually on the basis of 1990 production levels.

In transportation, an increased diesel engine usage, the broader use of trailers and semi-trailers, an improvement in road conditions, a complementation of maintenance and usage systems, etc., may result in saving 250,000 tons of gasoline and diesel fuel on the basis of 1990 production levels. The listed steps will, as calculations show, result in saving 1.4 million tons of fuel annually on the basis of 1990 production levels.

Despite a considerable increase in fuel efficiency usage, the development of the national economy will nevertheless result in a fuel usage increase of 140-150 percent by the end of the century. This increase cannot be met by an increase in shale oil production, because its geological reserves are sufficient only to meet the needs of large energy and oil shale production combines. The increased usage can be met only with natural gas. Therefore, a new gas pipeline into our republic must be constructed during the current Five-Year Plan, with the transportation capacity being at least 2.5 billion cubic meters annually.

Currently 81 percent of oil shale is used to produce electricity, and 19 percent is thermally transformed into shale oil and gas. In the Kohtla-Jarve Oil Shale Chemistry Production Collective im. V. I. Lenin, a generator that is capable of processing 1,000 tons of shale oil daily was installed; it is producing shale oil of high quality. Such machines will contribute to the reconstruction of the production collective. The Estonian and Baltic Power Stations contribute the cheapest electricity to the northwest area net. This is the result of the work of many energy experts who have considerably increased the reliability of the plants. As a result the Estonian Power Station delivers more energy than planned per year. By using pulverized oil shale in the production of electricity the sale is almost completely consumed. The oil shale ashes are delivered to the construction industry and agriculture. For the comprehensive exploration and implementation of methods regarding the usage of oil shale many energy experts of our republic were decorated in 1980 with the scientific and technical prize of the USSR.

A. Aleksandrov, President of the USSR Academy of Sciences visited our republic in February of this year. Afterwards he published an article in IZVESTIYA, in which he stressed that serious attention must be paid to the energy-related use of oil shale. He stated that in spite of the low caloric content of that fuel the collective of Estonian energy experts have developed methods to assure its continuous and complete combustion. He recommended that the methodology be also used in other large oil shale areas in Kazakhstan, the Volga area, and the Ukraine. Academician A. Aleksandrov deemed it especially important that the stable combustion of pulverized oil shale raises hopes for the development of electricity stations with a great deal of flexibility.

The electricity stations of our republic produce energy for the common northwest area net. The basic load of the entire system is developed on the basis of nuclear stations. The nuclear power station in Leningrad is completed, and the one at Ignalin is under construction. Nuclear plants work at a steady level. But the usage of electricity fluctuates during the day. Meeting peak demands becomes increasingly complex. There is a great practical need for machinery that could be laid still for the entire night. Lately an attempt to meet peak demands has been made by constructing joint hydro and nuclear stations. During the night the output is used to pump water from the lower reservoir into the higher one. During the day the output of both the nuclear station and the hydrological station is delivered into the net.

It should be taken into account that in a decade the installations of the Baltic Power Station are completely amortized; those of the Estonian Power Station will be amortized by the end of the century. The question of the future of oil shale energy comes up. Installing a plant in the Estonian Power Station to produce oil from pulverized oil shale by using solid fuel requires solving several problems (especially ecological ones) before its future usage can be determined. Basically, solid fuel instruments are designed to produce high quality fuel (oil) from lower quality fuel (oil shale). The oil produced can best be used by dispersed minor consumers, where it would have a considerable economic effect and replace heavy fuel oil.

Calculations show that the production of electricity by combustion of pulverized oil shale within 500 kW installation is 150 percent more efficient than the production of oil from that oil shale in a solid heat exchange installation. The comparison of the alternatives also shows that expenses to produce maneuver [sic] energy in 500 kW installations using pulverized oil shale are not greater than the same expenses in a hydro-nuclear complex. However, these expenses are considerably higher in a maneuver [sic] energy producing installation that uses solid heat exchangers to produce oil. Consequently it would be efficient to reconstruct the current oil shale electricity plants, once amortized, to produce energy on the basis of direct combustion of oil shale. The amount of oil shale presently used for electricity production would allow us to install production capacities of 5,000 to 6,000 kW.

And this is precisely an important task for the energy experts as well as other personnel dealing with the usage of oil shale in our republic: a new kind of boiler complex for a 500 kW turbocomplex must be designed.

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COAL INDUSTRY'S FIVE-YEAR PLAN TASKS, RELATED PROBLEMS DISCUSSED

Moscow UGOL' in Russian No 8, Aug 81 pp 3-9

[Article by B. F. Bratchenko, USSR minister of coal industry: "Urgent Tasks for Developing the USSR's Coal Industry"]

> [Excerpts] Socialist competition is the creative work of the masses. In its very essence itself it is founded on the high consciousness and initiative of the people. It is this initiative that will help to uncover and bring production reserves into action and raise the effectiveness and quality of work.--From the Accountability Report of the CPSU Central Committee to the 26th party congress.

Because of the tardy delivery of coal to concentrating plants, the supplementary tasks for processing coal and producing concentrate, as well as for producing graded coal for household needs, were not carried out.

Despite the fact that the plan for labor productivity for USSR Minugleprom [Ministry of Coal Industry] as a whole was fulfilled, certain associations did not achieve the planned goals for this most important indicator.

There are considerable deficiencies in capital construction, the organization of work and production, and the output of underground-mining equipment. Unless these are eliminated, it will be difficult to cope with the enormous tasks that the 26th CPSU Congress set for the coal industry.

In accordance with the "Main Directions" for the country as a whole, 770-800 million tons of coal will have to be mined in 1985, including 762-792 million tons by USSR Minugleprom. This is 53-83 million tons more than in 1980. With the increase in coal-mining volume, special attention has been paid to growth in the mining of coking coal in the Donets, Kuznetsk, Karaganda and Pechora Basins, and also to the anticipatory development of the mining of steam coal by strip mining in the country's eastern regions.

The ways and means for carrying out this important national-economic task were defined by 26th CPSU Congress decisions and also by previously adopted decrees of the

CPSU Central Committee and the USSR Council of Ministers on further development of the country's coal-mining industry.

In order to accomplish the task set for the industry, it is necessary to:

Speed up the pace of reequipping by introducing progressive technology and by creating and assimilating new equipment, and, on that basis, by providing for a rise in labor productivity and an improvement in technical and economic indicators. Increase the utilization effectiveness of existing production capacity, machinery, equipment and transport resources by reducing idle time, increasing the shiftwork factor, and introducing new operating schemes;

Concentrate efforts on the construction of new underground and strip mines and preparation plants and on the rebuilding of existing ones. Concentrate forces and funds on the most accelerated completion and startup of those enterprises that are capable of providing for the greatest growth in production output;

Create more favorable conditions for highly productive labor and for an intensification of its creative nature. Reduce manual and heavy labor still more and improve industrial hygiene and work safety. Expand the production of consumer goods, develop the services sphere, and improve the workers' material, social and living conditions;

Improve management of the industry. Systematically improve the organizational structure and increase the operating effectiveness of industrial and production associations, based upon further concentration and specialization of production. Intensify the savings regime and show a thrifty attitude toward the use of materials, labor, and power and financial resources; and

Develop socialist competition and the movement for a communist attitude toward work in every possible way. Intensify the influence of material and moral incentives on the achievements of high final work results.

An acceleration of scientific and technical progress in the coal industry and conversion primarily to an intensive path of development are of decisive significance in building up the country's fuel and power potential. A most important area of intensification is a further increase in the mining of coal by the more effective strip mining method. Strip mines, at which labor productivity is almost 10-fold higher than at underground mines and the prime cost of the coal mined is 4.4-fold less, have yielded two-thirds of total growth in the amounts of coal mined in recent years.

A large number of highly productive strip mines are operating in the industry. Among them are the Nazarovskiy and Irsha-Borodinskiy mines in Krasnoyarskiy Kray with annual capacities of, respectively, 13 and 18 million tons, and the world's largest strip mine, the Bogatyr' at Ekibastuz, with 50 million tons of capacity.

The development of strip coal mining is accompanied by an intensive supplying of machinery to enterprises at which highly productive excavating and transport equipment are being used, including rotary excavators with a productivity of 2,000 to 5,000 cubic meters per hour (figure 1 [not reproduced]), walking draglines with bucket capacities of 40 and 100 cubic meters per hour (figure 2 [not reproduced]) and with boom lengths of 85 and 100 meters, high-capacity dump trucks and dump cars, high-powered drilling equipment, and various automation devices.

Coal mining at strip mines by continuous-action excavators has increased greatly. With their help, 110 million tons of coal were mined, or 42 percent of all coal obtained at strip mines, in 1980.

The volume of mine-transport work grows continuously. This year 273 million tons of coal must be mined by strip mining—5 million tons more than in 1980, and the amount of stripping work will be increased by 60 million cubic meters. Especially important tasks face the Kemerovougol' and Ekibastuzugol' Associations, where a substantial lag in stripping and in preparing reserves was permitted. Subunits of the rail and road transport branches should extend considerable help to the miners.

Further development of the strip mining of coal is inseparably connected with the creation of the Ekibastuz, South Yakutia and Kansk-Achinsk fuel-and-power engineering complexes, and also with the buildup of strip mining capacity in the Kuzbass, which will enable strip mining's share to be further raised to 44-45 percent.

Among power-engineering giants, the largest will be KATEK [Kansk-Achinsk Fuel and Power-Engineering Complex], whose scale can be compared only with such construction projects of modern times as the BAM [Baykal-Amur Mainline]. In the KATEK zone large energy-intensive enterprises of ferrous and nonferrous metallurgy and the chemical, petrochemical and pulp-and-paper industries will be developed, and machinebuilding plants for the production of construction and road machinery, transport, electrical and power-engineering equipment, and so on will be built.

The main areas of use of Kansk-Achinsk coal are the supplying of huge thermal electric-power stations and the energy-technology treatment of the coal with a view to improving its physical and chemical properties and to enabling long-distance hauling. "Looking at the long term," Comrade L. I. Brezhnev said at the 26th CPSU Congress, "the fundamentals of the question of producing synthetic liquid fuels based upon Kansk-Achinsk Basin coal also should be studied."

A most important prerequisite for meeting the country's requirements for fuel and for increasing the effectiveness of power-engineering development and the reliability of the whole country's power supply is the wide involvement of this basin's inexpensive coal in the economic turnover.

Underground coal mining, the share of which of all coal mined in the country is more than 60 percent, also will be further developed during the 11th Five-Year Plan. More than a third of underground mining is performed by mines with an annual capacity of more than 1.5 million tons. Among the largest enterprises are the Underground Mines Raspadskaya in the Kuznetsk Basin with a capacity of 7.5 million tons per year, Vorgashorskaya No 1 in the Pechora Basin with a capacity of 4.5 million tons, the imeni Stakhanov and imeni 60-letiya Leninskiy Komsomol in the Donbass with capacities of, respectively, 4 and 3 million tons, and the Tentekskaya in the Karaganda Basin with a capacity of 4 million tons. The largest shale mine is the Estoniya, which yields 6 million tons of commercial shale per year.

In underground coal mining a chief factor in supporting plan fulfillment is the more complete use of mining machinery, primarily of longwall mining machines. During the first half of 1981 about 137 million tons of coal were mined from mine faces with integrated mechanization. Longwall mining machines are being used well in the Gukovugol', Vorkutaugol', Krasnoarmeyskugol' and some other associations. At the same time, half of the associations did not fulfill the plan for mining coal from mine faces that have longwall mining machines. Out of 103 longwall miners in the Leninskugol' Association, only 60 percent were operating. A similar situation prevailed also in the Chelyabinskugol', Lisichanskugol' and Antratsit Associations.

Protracted periods for assembling and disassembling equipment caused a reduction in the effectiveness of equipment utilization. Average time spent on the assembly of equipment in sections with integrated mechanization exceeds the standard time 1.5-fold to 3-fold, and 2-fold to 4-fold for disassembly, although there are no few examples of speedy conduct of these operations.

Some UkSSR Minugleprom underground mines permit the preparation and operation of longwalls 250-300 meters in length. As a rule, when these longwalls are equipped, the new mechanized supports are erected along with the old sections. This leads to a high accident rate and it slows mine-face advance.

Despite the exceptional importance of timely preparation of the breakage front for the stable operation of underground mines, not all associations are paying due attention to this yet. This year the drifting plan for the first 6 months was not fulfilled by the Vorkutaugol', Severokuzbassugol', Leninskugol', Selidovugol' and Pervomayskugol' Associations.

Scientists and machinebuilders who should improve the equipment and the technology for preparatory work are called upon to play a role of no small importance in providing for reproduction of the front for breakage operations.

The main directions for improving underground coal mining are the integrated mechanization of breakage work and the conduct of preparatory drifting with tunneling cutter-loaders. By 1985 the level of integrated mechanization for gently sloping seams and slanted seams should be brought up to an average of 78 percent for USSR Minuglеprom, and at 150 underground mines the conversion to integrated mechanization of breakage operations should be completed.

During the 11th Five-Year Plan underground mines must be prepared for the wide introduction of new means for integrated mechanization at a much higher technical level--with a 2-fold increase in the power-worker ratio of cutter-loaders, scraper-loaders and conveyors and a 1.8-fold to 2-fold increase in load-bearing capability of the supports--which are adapted for work under complicated mine-geology conditions and which enable high and steady workloads to be achieved at breakage faces.

For purposes of working seams with dip angles of less than 35 degrees, among the cutter-loaders that are now being produced the more improved K-1MKS, 2MK-75, OKP, OKP-70, KM-130 (figure 3 [not reproduced]), UKP, KM-103 (figure 4 [not reproduced]) and KMG cutter-loaders should be left in production through 1985. Coal machine-building plants should speed up mastery of the series production of new, highly productive and more reliable longwall mining machines.

Rational development of mining operations, which will provide not only for a rise in workload at breakage faces and in the mine but also for a reduction in coal losses and in nonproductive expenditures, should become the basis for further raising the engineering level of underground mining. Despite the great diversity of mine-geology conditions of the USSR's coal fields, the leading system for working seams is the room-and-pillar system, with breakage faces up to 150-200 meters long, using integrated mechanization that features cutter-loaders or scraper-loaders for excavating the coal.

Pillarfree technology, which permits a 20-percent reduction in the amount of preparatory (cutting) drifting work and a 12-percent reduction in coal losses in the excavated sections, as well as a reduction in the width of the unprotected zone at seams that present a hazard from sudden outbursts, is progressive. The advanced experience of the Pavlogradugol' Association, which has converted completely to pillarfree technology with the excavation of seams with long shafts along the dip and the rise, and which has basically completed the integrated mechanization of breakage operations, deserves study and dissemination.

The series manufacture of unified narrow-front cutter-loaders for thin and medium-thickness seams, with chainfree feed mechanism and automatic speed regulation, highly productive base two-chain conveyors equipped with electric motors of 110-315 kilowatts of power, and unified toolbar equipment should be mastered during the 11th Five-Year Plan.

In order to develop scraper-loader excavation, especially at thin seams, the output of highly productive automated SN-75, SO-75, USV and UST-2M installations must be expanded and their operating qualities simultaneously improved.

Mechanized complexes should preclude the use of heavy manual labor at the junctions of longwalls with gates, and, for this purpose, mechanized supports for the junctions should be created and their series production mastered more rapidly.

By 1985 the important tasks of reliably providing underground mines with a front for breakage operations and of improving the status of drifting work should be resolved. Mine drifting by cutter-loaders and cutting and drilling machinery that permit drifting speed and the tunnelers' labor productivity to be increased must be raised to the 42-43 percent level.

An orientation to the tunneling of cross-sections that are large in area will enable the status of tunneling to be improved and the workload at the breakage face to be increased, especially when excavating gas-bearing seams. In this connection, the most important tasks are the creation and wide introduction of heavy tunneling cutter-loaders of the GPK-2, 4PP-2Shch and 4PP-5 types, which enable tunneling of a mixed face up to 20-30 square meters in cross-section area that includes a segment of rock with a hardness of up to 6 on Professor M. M. Protod'yakonov's scale, allowing blasthole-drilling at mixed mine faces to be dispensed with and the tunnelers' work safety to be increased.

Hydraulic mining and hydraulic transport of coal by the rebuilding of existing mines and the construction of new hydraulic underground mines, are being developed further, as is the conversion to hydraulic mining of underground mines and sections in the Kuzbass that have complicated mine geology.

Growing intensification of the working of stoping excavations and the increase in freight flow that is associated therewith advance the task of reequipping mines with underground transport, the main direction of which is conveyorization.

During the 11th Five-Year Plan the level of use of conveyor transport must be brought up to 90 percent for sloped workings and up to 26 percent for horizontal workings, and the level of use of heavy electric locomotives for arterial haulage must be brought up to 50 percent. Moreover, the reliability and throughput of transporting schemes must be raised.

Questions of eliminating heavy manual labor for basic and auxiliary processes at coal enterprises,both by the accelerated introduction of equipment for integrated mechanization, remote control and automation and by the creation of manipulators and robotic equipment, are now emerging with special acuteness. The most important task of scientists and designers is to accelerate the development and creation of new automated breakage and tunneling cutter-loaders, drill rigs, mine support erectors, and other mining machinery with manipulators. The industry's machinebuilders and mine-repair plants should be included in this work.

Experimental models of automated complexes and equipment for mining coal without the constant presence of personnel at the breakage face should be created during the current five-year plan.

The industry faces major tasks in further developing coal machinebuilding. In the next few years it will be necessary to provide for a growth of more than 1 billion rubles' worth of productive capacity, including that obtained by introducing 820 million rubles' worth of new capacity into operation and by reequipping enterprises with 220 million rubles' worth of machinery.

Already this year Soyuzuglemash [All-Union Association for the Production of Coal-Industry Machinery] and Soyuzugleavtomatika [All-Union Association for the Production of Coal-Industry Automation Equipment] enterprises should greatly increase the output of mechanized complexes, supports, breakage cutter-loaders, loading machines, flight and belt conveyors, automating equipment and instruments, and other underground mining equipment and spare parts. More rapid development of coal machinebuilding is one of the decisive factors in intensifying coal mining during the 11th Five-Year Plan, because the industry will experience a shortage of labor resources, and the introduction of new coal-mine enterprise capacity will far exceed the output of the underground mines, which is falling behind because of the depletion of reserves.

In order to increase the output of underground mining equipment, funds allocated for developing coal machine building must be used completely, primarily to build up the capacity of the Kamenskiy Machinebuilding Plant, the Kopeysk Machinebuilding Plant imeni S. M. Kirov, the Druzhkovka Machinebuilding Plant imeni 50-letiya Sovetskaya Ukraina, the Aleksandrovka Machinebuilding Plant imeni K. Ye. Voroshilov and Kiselevsk Machinebuilding Plant imeni Chernyye. Internal reserves for increasing the production and improving the quality of the machinery and apparatus at existing enterprises by introducing advanced forms and methods for organizing work must also be sought.

Along with an increase in the output of underground mining equipment, it is of no less importance, when intensifying production, that more complete and, at the same time, more thrifty use be made of machinery, primarily of longwall miners.

The experience of the Underground Mines Trudovskaya, Krasnolimanskaya, imeni 7 Noyabr', Nagornaya, imeni Kostenko and others, where socialist competition for the preservation of equipment and for extending the service life of machinery between repairs is being promoted successfully, deserves the widest dissemination. If the operating time of machinery should increase 30-40 percent, this will yield an enormous reserve for supporting the industry with cutter-loaders, longwall miners, loading machines and other equipment.

Our construction organizations are to increase work volume substantially. Capital investment and construction and installing work volume are to increase by 30-35 percent over the last five-year plan.

Capacity for mining 7.1 million tons of coal and for preparing 7.8 million tons must be put into operation during 1981 through the construction of 3 new underground and strip mines and the rebuilding of 6 existing ones. In the Ukraine, the Dolzhanskaya-Kapital'naya Underground Mine, with a capacity of 3 million tons, and an enormous concentrating plant for preparing 6.8 million tons of anthracite per year are to be turned over for operation, the second phase of the Voroshilovgradskaya Underground Mine with a capacity of 750,000 tons is to be introduced, and rebuilding of the Novo-Dzerzhinskaya Underground Mine, with an increase of 250,000 tons of capacity, is to be completed.

Operations at the Dolzhanskaya-Kapital'naya mine are being conducted by high-speed methods. Eight brigades have committed themselves to carrying out at least 500,000 rubles' worth of construction and installing work at the facilities that are due for startup, and the mine-tunneling brigade of E. E. Blekh has undertaken a commitment to do 1 million rubles' worth of construction and installing work during the year.

The initiative of the Rostovshakhtostroy Combine and the Rostovugol' Association collectives, which have committed themselves to completing this year the rebuilding and introduction into operation of capacity for mining 520,000 tons of anthracite at Underground Mine No 26-27, Sambekovskaya, 2 years ahead of the established deadline, deserves attention. It is necessary to complete reconstruction of the Tomskaya Underground Mine and the Kedrovskiy Strip Mine in the Kuzbass with mining capacity increases of, respectively, 250,000 and 500,000 tons of coal, and of the Underground Mine imeni V. I. Lenin of the Karagandugol' Association and the Urgal mine of the Primorskugol' Association.

A task of the Moscow Coal Basin builders is to introduce the Berezovskaya Underground Mine with a capacity of 1.5 million tons of coal per year, at which more than 20 million rubles' worth of construction and installing work must be done this year. The results of a creative search by engineering-services workers of Mosbassshakhtostroy [Combine for the Construction of Underground Coal Mines in the Moscow Coal Basin] and designers of Giproshakht [State Institute for the Design of Underground Mines] have enabled the labor intensiveness of the work to be sharply reduced by the introduction of lightweight metal structure and outfitted modular installations. Thanks to this, the unit of an auxiliary shaft was erected in 6 months instead of a year and a half. At the same time, substantial lags have been allowed in mine tunneling; this is a decisive factor in the timely introduction of underground mines into operation. Mosbassshakhtostroy supervisors need to take urgent steps to raise the pace and quality of tunneling.

In the Pechora Coal Basin construction of the second phase of the Kapital'naya Underground Mine and group preparation plant for treating 1 million tons of coal per year must be completed. The joint efforts of Pechorshakhtostroy [Combine for the Construction of Underground Coal Mines in the Pechora Coal Basin] and the Intaugol' Association are needed here in order to eliminate a lag in the construction of this important facility, which is due for early startup. Construction should be promoted more intensively in the Kuzbass. During the five-year plan here it is necessary to support the introduction of 2 million tons of capacity at the Taldinskiy Strip Mine and 1.5 million tons at the Karakanskiy Section, to undertake construction of the Bachatskiy Strip Mine, and to speed up work on the introduction of new horizons and the rebuilding of the surface industrial facilities of existing underground mines.

In the Ekibastuz Basin, 22.5 million tons of capacity at the Vostochnyy Strip Mine are to be introduced.

Erection of the Kansk-Achinsk Fuel and Power-Engineering Complex, where the first phase of the Berezovskiy Strip Mine No 1 must be introduced and rebuilding of the Irsha-Borodinskiy Strip Mine must be completed, is becoming a most important shock-work construction project.

In South Yakutia, construction of the Neryungrinskiy Strip Mine, with a capacity of 13 million tons, and a preparation plant will be completed.

The construction of housing and facilities for social, cultural and personal-amenity purposes remains, as before, a first priority task.

We have great reserves and unused potential for improving capital construction. Industrial-type methods must be introduced more widely, the brigade contract must be promoted in every possible way, and advanced experience must be disseminated.

Along with new construction, a most important reserve for building up coal mining is the full assimilation of the productive capacity of existing enterprises. This question acquires exceptional importance during the 11th Five-Year Plan since, because of the depletion of reserves and the worsening of mine-geology conditions, the capacity of the underground-mine inventory will be reduced by about 82 million tons, and growth as a result of new construction and the rebuilding of existing underground and strip mines will come to only about 115 million tons.

The standard productive capacity of underground and strip mines of USSR Minugleprom as a whole was assimilated 100.4 percent in the first half year of 1981. At the same time, more than 40 percent of the underground mines and strip mines did not carry out the task for this indicator. The coal mined was 13 million tons less than the production capacity. Capacity is being assimilated especially poorly in the Pervomayskugol', Shakhterskantratsit, Severokuzbassugol' and Primorskugol' Associations.

One cannot help but notice that recent attempts to revise established production capacity by way of reductions are being initiated in various associations and in UkSSR Minugleprom. Such a practice, which was discussed at the 26th CPUS Congress, should cease. The procedure for change in capacity because of depletion of reserves or change of operating regime was established long ago and should be strictly adhered to.

New enterprises introduced in the past 10 years are not assimilating their production capacity satisfactorily. Among them are the Underground Mines

Yuzhno-Donbasskaya of the Donetskugol' Association, Progress of the Torezantratsit Association, Novo-Mirgorodskaya of the Aleksandriyaugol' Association, and Bel'kovskaya and Vladimirovskaya of the Moscow Basin.

The main causes for failure to assimilate capacity by the new underground mines are the introduction of enterprises with inadequately developed fronts for breakage operations, a lack of the highly productive mining machinery called for by the designs, slow elimination of construction deficiencies and correction of errors committed by the design organizations, and a shortage of workers because of poor provisioning for housing. The most tireless attention must be paid to eliminating these factors.

During the 11th Five-Year Plan the volume of coal mining and processing is to grow, mainly through increased labor productivity. Based upon this important task, USSR Minugleprom has worked out and approved for 1981 differentiated tasks for gross output per worker in a way that will enable overfulfillment of the plan by at least 1 percent by associations on the whole that mine coal predominantly by the underground method and by 1.5 percent for other associations.

Where there is a shortage of labor resources, attention should be paid to more rational use thereof, since there are still substantial deficiencies here. In the Severokuzbassugol' Association, for instance, worker manning for coal mining at underground mines increased by 3 percent but on the surface by 10.6 percent during the 10th Five-Year Plan, at a time when the number of workers engaged in breakage face work had been reduced by 4.6 percent. In the Karagandaugol' Association, the number of workers at breakage faces rose by 2.6 percent and at the surface of the mines by 18 percent. Such proportions are intolerable.

An integrated program for raising labor productivity at USSR Minugleprom enterprises and organizations during 1981-1985 is now being worked out. Associations must approach with all earnestness the development of such a program for each enterprise, which will provide for the accelerated growth of labor productivity.

In the execution of these decrees [not cited in these excerpts] the industry has developed and introduced a new procedure for planning scientific and technical progress on a cost-accounting basis. New wholesale prices for coal have been worked out and approved. The Soyuzuglemash and Soyuzugleavtomatike associations have been converted to planning production volume according to standard net output.

> An intensification of economic activity and a rise in its effectiveness consist primarily, if this formula is restated in everyday language, in production results growing more rapidly than production expenditures, in such a way that although comparatively fewer resources are enlisted for production, it is possible to achieve more. Planning and scientific, technical and structural policy should be subordinated to the accomplishment of this task. Methods of management and policy in the area of control also should work for effectiveness.—From the Accountability Report of the CPSU Central Committee to the 26th party congress.

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RAMIFICATIONS OF USING COAL-MINE METHANE DISCUSSED

Moscow EKONOMICHESKAYA GAZETA in Russian No 30, Jul 81 p 16

[Article by B. Sidorenko (Donetsk): "With a Bit of Initiative..."]

> [Excerpt] About the use of mine gas in the Donbass [Donets Coal Basin].

Mine gas has been well known to many generations of miners. The first mine experts encountered this dangerous force of nature. "Explosions of a mixture of mine gas with air is extraordinarily destructive," reported an old encyclopedic dictionary, "and in mines that are dangerous because of gas, a gas regime is established: strong ventilation, prohibition of the burning of an open flame, and other precautionary measures."

Mine gas now has been practically subdued. The gas is drawn off, gathered underground and discharged at the surface, both prior to the start of excavation of a coal seam and, afterwards, from the evacuated space. A degassing service, furnished with modern equipment, makes the miners' work safe.

It was established long ago that mine gas consists chiefly of methane. But methane, as is known, is also a fuel, as well as a raw material for obtaining valuable chemical products. This accompanying gas can and should find wide application in the national economy.

These figures are interesting. More than a hundred Donbass mines engage in degassing. It has been estimated that the daily output of methane is more than 2 million cubic meters. And this figure will grow. For the deeper the excavation, the higher the gas content of the coal seam. Many miners' collectives are now mining fuel at a depth of more than a kilometer. As a percent of the recovery of natural gas, methane from mines does not amount to very much. But indeed the gas is incidental. Why do we reject this generous gift from the earth? And what is very important, it is obtained where there is no natural gas at all, or not enough of it. Undoubtedly, the replacement of coal, which is so valuable for us, by mine methane will bring an appreciable saving.

There Is Experience, But...

Donbass miners were the first in our country to begin to use mine methane as a fuel. Back at the start of the 1950's successful tests were conducted at Donetsk and Shakhtersk on the burning of methane in boilers that heated production and household premises.

Institutes energetically joined in this work. Scientists of MAKNII [Makeyevka Scientific-Research Institute on Work Safety in the Coal Industry] and DONUGI [Donetsk Scientific-Research Institute for Coal] substantiated the desirability of using mine gas instead of coal in boilers and, together with experienced workers, they developed specific measures. At the start of the 1970's methane began to be used at 26 underground mines. The annual coal saving reached 140,000 tons, and the number of workers in the boilerhouses was reduced by 135. The total economic benefit was more than 1½ million rubles per year.

USSR Minugleprom [Ministry of Coal Industry] became concerned in good time about dissemination of this valuable initiative. An All-Union seminar dedicated to experience in the use of mine methane was held at Donetsk. A large number of questions was touched on, and scientists and experienced workers adopted useful recommendations.

It would seem that the facts and figures speak for themselves. The valuable initiative deserves the widest dissemination. But in recent years the number of mines where methane is used as a fuel has not been increased, and it has even been reduced. According to UkSSR Minugleprom data, 23 such mines remain.

Just what is holding back development of this valuable initiative?

"There is still no one organization or agency that will undertake this problem as a project," says O. Kasimov, manager of MAKNII's Department for the Degassing of Coal Mines. "The gas workers have their own concerns. The miners consider that their business is to mine coal. Local soviet organs pay little attention to it."

Oleg Ivanovich was convinced: obtaining mine methane can be included in the plan of many miners' collectives, along with the mining of solid fuel. The unit of measurement in this case would be the kilocalorie.

"For if a mine that discharges valuable methane into the air is prohibited from using coal for its own needs," Oleg Ivanovich reflects, "surely the utilization of the gas will become for him a problem fairly rapidly."

The coal miners today are not only going into the depths of the earth deeper but also more broadly. Mine faces are moving increasingly away from the main shaft. Naturally, this makes it more difficult to use mine methane in boilerhouses. For degassing, holes have to be drilled far into the steppe. And what if this gas, which is found close to agricultural enterprises, is to be sold? Again, there is the question of who will do this.

Not Just Enthusiasm Is Needed

The boilerhouse at the Glubokaya Underground Mine of the Donetskugol' Production Association has been operating on methane for more than 10 years. The annual benefit is 100,000 rubles.

"During this time we have had not even one insignificant emergency," says chief mechanical engineer A. Kolesnik. "The notion about methane as a dangerous force of nature is always put in the past tense."

Anatoliy Vasil'yevich is an active proponent of mine-gas utilization. He speaks with animation about the advantages of its use and its prospects for the future. But he cannot conceal bitterness when the conversation turns to problems and unresolved questions.

"The whole thing is being supported now by enthusiasts. Each gets the needed equipment at his own responsibility and risk and installs it. The time to do this in centralized fashion came long ago."

One cannot help but agree with Anatoliy Vasil'yevich. Take, for example, the vacuum pumps, which are indispensable for getting the gas. Industry produces few of them, and they are old in design and often of low quality. The service life of the pumps manufactured at the Rutchenkov Machinery Plant does not exceed even 1 year. There are not enough drills and pipe for moving the methane. Naturally, specalization of one of the plants in producing completely outfitted equipment and in the centralized supply thereof would change the situation considerably.

At the Glubokaya mine, only half of the methane that is drawn to the surface is used. The percent of its utilization is especially low in the summer, when the demand for heat is sharply reduced. What do you do with methane in the summer months? This problem did not just disturb the mine's heat engineers, they have specific recommendations.

Just a stone's throw away are production facilities of Donetskzhelezobeton [Donetsk Reinforced-Concrete Products Association] and the Makeyevka Housing Construction Combine. Both enterprises are experiencing a shortage of natural gas. "Take our methane," say the miners. It is not so complicated to lay some tens of meters of pipeline. Unfortunately, the matter did not progress beyond some talks. It is true, once Donetskzhelezobeton had completely decided on it, but it did not find a contractor to carry out the design.

It stands to reason that the establishment of a special contracting organization to realize such orders would change the situation considerably. There is a contractor in the republic's coal industry--Donetskugleavtomatika [Donetsk Trust for Automation of the Coal Industry] that is engaged in executing designs for the utilization of gas.

"But it has little capacity and cannot cope with the existing amounts of work," complains heat-engineer A. Soldatenko of Donetskugol' [Donetsk Coal Mining Association].

The problem of full utilization of mine gas sharply disturbs right now all miners' collectives that are learning how to use it. Donetskugol' is burning about 20 percent of the obtained methane in boilers. This indicator is still lower throughout the Donass as a whole.

There is a broad field of activity for both scientists and for managers in the matter of increasing the amount of mine gas utilized. Why not, we say, use mine methane for heating housing? Many miners' settlements are situated very close to the mines. And this problem, as the specialists affirm, is not of special complexity in respect to technology. In the opinion of some scientists, the erection of ring-type gas pipelines, which would join the mines and connect them with coking, gas and other plants, can be highly effective.

The unused gas, the heat engineers estimate, could be pumped into tanks for conservation. The difficulty here is, where to put the necessary equipment for liquefying it. Special tanks for creating a methane reserve would not be a bad thing. For in the winter, when the temperature drops below 20 degrees, interruptions in its delivery are possible.

Go Farther

Can all of the mine gas be burned in boilers without preliminary treatment? Not all of it, it turns out. Only gas in which the methane content is 30 percent or more. Specialists call it quality standardized. This is the well-known mix of fuel and air that is ready for boilers. What is to be done with gas that is not quality standardized? "Bring it up to the quality standard," say the scientists.

The Underground Mine imeni Gor'kiy is located in the very center of Donetsk. Degassing has been done here for a long time. Naturally, the miners could not be bothered that gas was being discharged into the air. The difficulty was the fact that it was not quality standardized. Donetsk Polytechnical Institute scientists recommended a way out. A special gas treatment stations, GPS-1, was developed. Natural gas that comes to the boilerhouse should be mixed with the mine methane to bring it up to the required quality standard.

And so, on the eve of the opening of the 26th CPSU Congress, GPS-1 went into operation. Now the pipelines for natural gas and mine methane, which previously was discharged into the atmosphere, are combined. The enriched mixture is burned in boilers. The estimated benefit is 4,000 tons of standard fuel equivalent per year, or a saving of 70,000 rubles. And the budget-estimated cost of the station was 80,000 rubles. So it will pay for itself in a year.

But there is no natural gas at many mines. In this case, DPI [Donetsk Polytechnical Institute] scientists propose another variant--a quality-nonstandardized mixture--by blowing it into boilers for burning with coal. It is possible, as a result, to save up to 30 percent of the solid fuel. Such an installation, the GPS-2, will be introduced in 1982 at the Oktyabr'skaya Underground Mine of the Donetskugol' Association.

In brief, with a creative approach, the amount of mine gas being utilized can be greatly increased. The efforts of all concerned organizations and agencies must be combined. It was mentioned above that methane is not only a fuel but also a most valuable raw material for the chemical industry. Certainly it is sensible for USSR Minkhimprom [Ministry of Chemical Industry] to discuss with Minugleprom the problem of using mine gas for chemical needs.

Not by far have the scientists said everything about this question. Their interest in mine methane utilization has grown recently. But in the Donbass only one institute--Donetsk Polytechnical Institute--is now engaged in developing methods for using mine gas. For instance, a laboratory in MAKNII for developing methods for extracting the methane at the coal fields, which was discussed a long time ago, has not been established. Specialists are expecting a great return also from the

Institute of Mineral Fuels, which is the branch's prime institute. Indeed, there is not even any standards documentation for guiding the design of systems for gathering and treating mine gas for combustion.

But the most important voice in solving this problem belongs to USSR Gosplan. The time has come when the reporting, planning and monitoring of the mine methane--a most valuable raw-material byproduct of the republic's coal industry--must be organized. Life requires this urgently. Everyone with whom I talked shares this point of view.

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FUELS

STEPS TAKEN TO INCREASE TURKMEN GAS RECOVERY RECITED

Ashkhabad TURKMENSKAYA ISKRA in Russian 12 Aug 81 p 2

[Article by V. Petrov, general director of the Order of Lenin Turkmenneft' [Turkmen SSR Oil Recovery Association]: "To Make the Formation More Generous"]

[Excerpts] The country's oilfield workers face major complicated tasks during the 11th Five-Year Plan. It is planned that by the end of 1985 oil recovery will be brought up to 620-645 million tons. And the collective of the Order of Lenin Turkmenneft' Production Association should make its contribution to further developing the fuel and power base. During the five-year plan the recovery of "black gold" and gas should increase greatly.

The first months of the new five-year plan have ended. A foundation has been laid for the fulfillment of the plans contemplated by the "Main Directions" for the USSR's economic and social development. A good start has been made. Since the beginning of the year 16,000 tons of oil and more than 62 million cubic meters of the blue fuel have been recovered above the plan. The plan for exploratory-hole penetration has been met.

Collectives of the Nebitdagneft', Kumdagneft' and Kamyshldzhaneft' oil and gas recovery administrations, the Nebit-Dag Drilling Administration, and the Koturtepe Industrial Transport Administration are coping successfully with the plans and have organized the production process skillfully. The collectives of 13 of the association's enterprises and organizations have taken prize places in the All-Union socialist competition for the first quarter. And one more enterprise has been heartened by its success--the Koturtepe Drilling Administration. In the second quarter its collective proved that, by bringing internal reserves into operation, the hole-penetration program can be carried out steadily and smoothly without interruptions under difficult conditions.

It is important to equip the drillers with progressive equipment and technology. Work is being done now to introduce low-rpm drilling and new types of highly productive bits that have the advantage of steadiness of the mounting over ordinary bits and which enable drilling with regulated pressure in the "hole-formation" system to be increased. We are planning to convert completely to the use everywhere of high-quality powdered materials. The mastery of new types of reactants based upon polymers, which possess high effectiveness in processing drilling muds, has started.

The progressive method of drilling holes with electric drills, the volume of which will be brought up to 220,000 meters per year by 1985, will be further developed, that is, it will double the level achieved last year. The Nebit-Dag UBR [Drilling Administration] has begun to master the electric drill. Here, in the Barsa-Gel'mes and Burui areas, it is planned to drill a series of slant directional cluster wells with electric drills, using a telemetry system for orienting the boreholes which will enable the construction cycle for them to be shortened.

Recent discovery of the new Yuzhnyy Bugdayli, Keymir, Ekizak and other gas and oil fields indicate that the resources of the redbeds that have been explored and developed in our republic for many years now still have not been exhausted. The promising Korpedzhe, Vostochnyy Kamyshldzha, Bugdayli, Akeser and other areas will be built up and put under exploration in the near future.

But the development of the oil and gas recovery industry in the southwestern region of our republic involves not just detailed exploration and an increase in the operating effectiveness of old areas. A new Mesozoic complex, which, according to prognoses, is highly promising and for a detailed study of which four holes are now being drilled, is to be mastered. The greatest prospects are associated with hole No 25 in the Monzhukly area. It has reached the designed depth, but drilling has not stopped; it was decided to drill into the formations below the designed level. The drilling of another 5 such holes is planned for this year. And by the end of the five-year plan drilling work at the Mesozoic will triple.

The most reassuring scientific prognoses involve regions that have not been well studied geologically--the Kopet-Dag trough and the Kazandzhik depression. Unfortunately, the work pace here is being impeded because of the lack of an inventory of prepared geological structures. The Turkmen SSR Geological Administration must speed up geophysical study and greatly increase the number of structures in these zones that are turned over to the association for drilling over.

Much work is being done to raise effectiveness of the development of those areas where oil and gas recovery is in progress. An integrated program is being carried out to improve the status of the well inventory and to reduce the share of inactive wells and of wells with flows that are below their potential.

The achievements of science and technology in preventing the forming of paraffin deposits and the appearance of sand in the pipes are being introduced widely. The oilfield workers are using condensate, chemical reactants and foam cements for these purposes.

Oil industry workers have been given the task of bringing the level of oil recovery at automated oilfields up to 90 percent of the total amount. Turkmenneft' Association has worked out a program for automating production. Design and budget-estimating documentation is being prepared, and engineering solutions have been produced in the main areas. Much work on automation of oilfields is being done at the NGDU's of Nebitdagneft' and Leninneft'.

During this five-year plan, constant automated monitoring of the work of the whole operating inventory of oil and injection arteries is to be provided for, wells that are operating by means of sucker-rod and electrical centrifugal pumps are to be equipped with reliable control stations, oilfield and brigade reporting of the oil that has been recovered is to be organized, all commodity-handling operations are to be converted to the tankfree method, and automatic means for monitoring drilling are to be introduced.

A set of measures to strengthen the supply and equipment base and to improve the management system is being implemented. Production-services bases are being built at oil-and-gas recovery and drilling administrations. Supply bases are being expanded and mechanized. A system of mechanized storage facilities for free-flowing materials--cement, weighting materials and bentonite clays--is being established. A central tool and pipe base is being built. The machinery-repair plant, which, in order to satisfy the oilfield workers' requirements more completely, had been transformed into a central base for production services, is being rebuilt.

A new administration for gathering casing-head gas, the utilization of which has been brought up to 96 percent, and for transporting it within the oilfield has been created. By the end of the five-year plan casing-head gas will be shipped entirely by gas pipeline. For this purpose, a special gas compressor station has been erected at Koturtepe, and another will be built at Barsa-Gel'mes.

The experiment on the reorganization of the regional industrial-engineering services into specialized services is being accomplished successfully. As yet, this is being conducted at one Nebit-Dag drilling administration.

The advantages of gaslift recovery still are not being used fully in oil recovery. Further development of gas-distributing banks, the connection of the wells to them, the use of more improved equipment, and prevention of the forming of hydrate deposits in pipes will undoubtedly yield substantial benefit. We are obtaining good results from the installation of highly productive electrical centrifugal pumps. The oil-recovery workers understood long ago the advantages that this equipment produces and are introducing it voluntarily. They would like only to receive more of this equipment.

Two pumphouses for pumping the waste water that is recovered along with the crude into the formation at Barsa-Gel'mes and Koturtepe were started up recently. However, the degree of maintenance of formation pressure is far from satisfying the oilfield workers. This must be doubled. Boosting these and other operations at the oilfields will help crude to be recovered more completely and development of the oilfields to be improved.

This year, for the first time, a gardening partnership has been established. True, for the time being 80 workers have received sections, but the assignment of land will continue as the water-supply problem is solved. This will yield additional opportunities to provide the oilfield workers with vegetables, fruits and melons.

It is planned to erect a health center on a shared basis on the Caspian shore. Housing construction will be increased. And it is planned to build a new vocational and technical school to train cadres of oilfield workers.

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BUILDUP OF SOVETABAD GAS-FIELD FACILITIES IS TOO SLOW

Ashkhabad TURKMENSKAYA ISKRA in Russian 5 Aug 81 p 2

[Article by V. Antonishin: "A Build-up at a Fast Pace Is Needed"]

> [Excerpts] "In the Turkmen SSR...bring gas recovery up to 81-83 billion cubic meters." (From the Main Directions for the Economic and Social Development of the USSR During 1981-1985 and During the Period up to 1990.")

After the geological explorers come the builders, who put the earth's riches at the service of the motherland. They have done much in the district, which is marked on the republic's map by fiery torches. Next in line is a gigantic storehouse of the blue fuel--the Sovetabad field. To the collective of SU-3 [Construction Administration No 3] of Shatlykgazstroy [Shatlyk Trust for the Construction of Gas Field Facilities] has fallen the honor of starting the build-up of the field's first phase.

Cutting off the top of a desert dune, the first landing party set up a settlement for temporary-duty personnel 40 kilometers from Serakhs, the rayon center. Here there is everything for normal work in people's lives: new well-appointed mobile housing, a dining room, a shower, a reading and recreation room, a power plant, television sets and refrigerators.

The subcontractor--SMU-5 [Construction and Installing Administration No 5] of Sredazneftegazmontazh [Central Asian Trust for the Erection of Oil and Gas Facilities]--went after the job enthusiastically and with motivation. It is taking part in the laying of a 35-kilometer gas pipeline, which will be connected to the trunk pipeline. Six special vehicles have been assigned for hauling the pipe. Without delay the rotary welding and then the overhead welding of the pipe were arranged. The collective made a considerable revision of the work calendar. In less than 7 months it carried out the work planned for a year.

Such is the first impression about the construction project that is underway to the west of Sovetabad field. But the deeper you get into the essence of the matter, the more omissions you will discover.

An industrial landscape opens up from the summit of the inhabited islet. Closely grouped drill rigs, pipeline strands, and structures of the most varied purposes that have been set up are visible. The eye involuntarily stops on a neighboring sand dune that is overgrown with stunted vegetation. According to the schedule, work should be going on full blast here to establish the site for an integrated gas-treatment installation (UKPG). Much vertical and horizontal planing must be done, a large amount of soil must be moved, and utility and service lines must be laid. And earthmoving equipment primarily is needed for this purpose. But there is none. The managers of the specialized administration for mechanized operations of Shatlykgazstroy, which is charged with the earthmoving work, has sent the machinery to other construction projects. Only one-third of the land at the UKPG site has been planed. It is obvious to everyone that, at this rate, work fronts for the erectors will not be prepared soon. And this will inevitably set back the dates for erection of the industrial equipment and startup of the installation operation.

Among the problems that require most rapid solution is that of supplying the construction project with water. Delivering it by vehicle is extra work and it is not reliable. But water for domestic-services and industrial needs is increasingly required. The lack of roads aggravates the situation. The design calls for laying a water line to the nearest water supply, and then to Serakhs and the Karakum Canal.

It cannot be said that SU-3's supervisors are not paying attention to the facility due for startup. Using experience in building facilities at Shatlyk, Berdeushik and other gas fields, they have improved work organization and the technology. In particular, they have dispensed with subcontractor services for insulating and laying pipe. They did these operations more quickly and with better quality with their own forces. Time is thereby won and idle time is reduced.

But still the prime contractor has not achieved the required pace on the route. Only about 4 kilometers of water pipe have been laid, much less than contemplated. In the first half of the year, 22,000 rubles instead of the planned 40,000 were assimilated. That same SUMR [specialized administration for mechanized operations] is letting people down. Earthmoving work is scarcely being conducted. But even the prime contractor himself does not have many people here. However highly productively they work, not much gets done.

The first-priority facility for any construction project is the access road. For Turkmenistan's gas-industry builders, this is especially needed. SU-7 of Shatlykgazstroy is charged with laying one from the Serakhs settlement to the UKPG. The client, the Turkmengazprom Industrial Association, is calm about this facility. The chief of the section for building up association facilities, V. Leshev, has reported that the construction is, he says, going on full blast: an earthen roadway has been prepared, sand preparation has been carried out completely, and the single-layer crushed-rock topping has been completed. But this is true only for an insignificant stretch of the road adjacent to Serakhs. No work is being done on the rest of it. Heavily loaded vehicles get to the rotating-personnel settlement along a winding, bumpy desert rut. The equipment goes out of commission prematurely, and the delivery of supplies is disrupted.

Only a single bulldozer and a few scrapers, excavators and dump trucks are at work on the route. Is it surprising that only a tenth of the appropriations released has been assimilated?

The contribution that the drillers are making to the buildup of the field cannot be overestimated. They have already turned over three wells. Just as many are in the drilling stage, and one is being erected. The brigade of drilling foreman Hero of

Socialist Labor P. Shcheblykin was one of the first to come here. After gaining experience, the brigade, using new equipment, has improved the technical and economic indicators day by day. The brigade of drilling foreman A. Magomedov drilled operations-testing well No 116 in record time. The data obtained by it will help other collectives to increase penetration speed and to avoid complications. But on the whole, the plan for the first half of the year for drilling at the section has not been carried out. They have not got rid of idle equipment time here, and the supplying of materials is organized irregularly. The fact that the supervisors of the drilling section of the industrial association never took any kind of active measures to eliminate the lag is disturbing.

The importance of the new gas capacity that is under construction to the west of the Sovetabad field is difficult to overestimate. In the first place, the country will get from here a large amount of Turkmen gas. Second, during experimental test operation, the optimal parameters for operating the industrial equipment will be determined and other necessary information will be obtained. Without all this it will be impossible to assimilate the enormous natural-gas reserves of the region systematically and with high effectiveness. The prime contractor, despite certain achievements, is building up the facilities at a slow pace. Work still has not been started on such facilities that are included in the complex due for early startup as the condensate pipelines, the drilling base, service lines to the wells and water-intake structures.

Undoubtedly many omissions in the work could have been avoided had there been a good "conductor" on the project. He would have managed to direct the efforts of the people into one channel and to organize the construction in accordance with the design. True, such "conductors" exist in the formal sense. The industrial association created a board of directors, which is under R. Annayev, for the complex that is being built. But it is not performing its direct functions. Noninterference in the construction project's affairs led to no one's adhering to the schedule for building up the facilities, and, in most cases, to more profitable and less labor-intensive operations being done on the linear structures.

In brief, the facilities at the field should be built up at a more rapid pace.

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BUILDERS OF NEW URENGOY-PETROVSK PIPELINE FACE STIFF REQUIREMENTS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Jul 81 p 1

[Article by M. Malakhova (Perm'-Ufa): "Urengoy: A River of Gas"]

[Text] A subunit of Minneftegazstroy [Ministry of Construction of Oil and Gas Industry Enterprises] has undertaken to weld pipe into the strand of the second thousand of kilometers of pipe on still another gas-pipeline giant: the Urengoy-Nizhnyaya Tura-Petrovsk line. Just like at the start of the operation, the best welding-and-erecting brigades of Glavvostoktruboprovodstroy [Main Administration for the Construction of Pipelines in the Eastern Economic Region], under B. Tyrykin, Ye. Sukharev and N. Mamontov, have been distinguishing themselves. Each of them carried out the plan for the first 6 months of the first year of the 11th Five-Year Plan ahead of time.

The new gas pipeline is one of seven that will be laid from the Urengoy field during this five-year plan. And all are almost a meter and a half in diameter. Although the line duplicates to a known extent one already laid from Urengoy to Petrovsk and Novopskov, the builders expect no few new experiences.

Conditions for the construction project in the Transob' area are especially severe. Here there are regions that are still unknown and complicated in their natural conditions. The work sites for the new line here must be prepared to take into account later development of the gas-transport system of the whole West Siberia region. The Urengoy-Yelets, Urengoy-Novopskov and certain other arterials will be laid in one corridor parallel to the arterial that is being built. All this is complicating the tasks of today's linebuilders.

Underwater builders are to lay about 100 kilometers of the pipeline under stream beds. There are no few giant crossings on the route. Thus, the length of the underwater section of the Ob' crossing will be 14 kilometers, and across the Sok River it will be 7.8 kilometers.

Major work is being done to preserve arable land, over which the gas pipeline will pass for a distance of more than 950 kilometers. Prior to doing earthmoving work, the builders will carry the fertile layer of soil from the route with precision and, after completion of the construction work, they will return it to its place.

Preliminary cooling of the gas that is to be transported, which is called for at all 25 compressor stations that are being built along the route, is aimed at preserving the ecological equilibrium. In so doing, cooling the gas to -1 to -2 degrees will be done around the clock at the Urengoy station. This will not only raise the pipeline's throughput but will also prevent thawing of the permafost and its breakdown and washing away of the vegetation cover.

The gas pipeline's throughput will be 32 billion cubic meters of gas per year.

The builders are striving to introduce ahead of time the 1,300 kilometers of the arterial planned for this year.

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BRIEFS

OIL-WELL WATER ISOLATION--Compositions based upon cement and synthetic resins that establish a water-impermeable screen are being used to isolate formation water in oil wells. However, during pumping they get into the oil-saturated part of the formation and plug it up. Moreover, the synthetic resins contain scarce, expensive components and have increased requirements for transport and storage. Various components of the composition that are based upon synthetic resins also possess toxic properties. Also, preparation and pumping into the well of components based upon cement and synthetic resins face increased demands because of the danger that they will harden in the wellbore. AzNIPIneft' [Azerbaijan Scientific-Research and Design Institute for the Petroleum Industry] scientists and specialists have proposed a composition based upon crude oil, granulated faience filled with crude oil, and rubber crumb. The granulated faience, just like the rubber crumb, is prepared from production waste. Use of the new composition will help to raise the effectiveness and quality of work to isolate formation water in the well. The economic benefit is roughly estimated at 3,966 rubles per year per well. [Text] [Baku VYSHKA in Russian 11 Jul 81 p 2] 11409

MISCELLANEOUS FUEL NOTES-- The billionth ton of crude oil has been recovered at Samotlor. This much fuel was obtained in little more than 12 years of development. A new oilfield discovered in the central park of Azerbaijan has confirmed the correctness of the geologists' policy of moving from the traditional oil-bearing regions to the west. New deposits of oil and gas have been found in the area of the known Miroshnikov field in the Caspian depression. This was done thanks greatly to photography from space. Miners of the Vorkutinskaya Underground Mine are mastering its capacity in advance of the standard deadline. They have sent Cherepovets metallurgists a million tons of coking coal since the start of the year. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 32, Aug 81 p 3] 11409

URENGOY-PETROVSK GAS PIPELINE--Gornozavodsk-Moscow--The welding-and-erecting brigades of the largest fuel-and-energy construction project of the first year of the 11th Five-Year Plan--the Urengoy-Nizhnyaya Tura-Petrovsk gas pipeline--have achieved a great success. The welding of pipe on a 1,273-kilometer section of the arterial, or about half the whole trunk line, has been completed. "Although certain construction and installing and startup and setting-up operations remain to be performed as part of the work of welding the arterial, the success of the workers is indubitable," states Deputy Minister of Construction of Petroleum and Gas Industry Enterprises G. Sudobin. "Work on the route that was to have taken a year was done in half a year. This enabled the industry's advanced collectives to come out with a valuable initiative. They proposed to begin competition to introduce the transcontinental arterial as a whole into operation ahead of time, including segments that were to be erected next year." [B. Tamarin] [Text] [Moscow PRAVDA in Russian 15 Aug 81 p 1] 11409

NEW GEOPHYSICAL TECHNIQUE CLAIMED--Shevchenko, 20 Jul--A well that has been drilled in the Oymashya tract has dictated a new look at the prospects for developing the main oil-bearing area of the Kazakhstan-Mangyshlak Peninsula region. It was able to detect liquid fuel in ancient granites, where, according to previous notions, there could be no deposits of "black gold." An integrated technology for detecting oil, which was worked out by the collective of Mangyshlakneftegeofizika [Mangyshlak Trust for Oilfield Geophysical Operations] was able to penetrate a secret of the earth. It has doubled the effectiveness of a basic tool of the geophysicists--seismic waves, and improved the "image" of rocks that had been deposited at a great depth. An exploratory hole, the results of the drilling of which completely confirmed the specialists' prognoses, was founded on the basis of an analysis of the data obtained. The geophysicists have undertaken additional exploration of an area where ancient crystalline rocks, which previously had been considered unpromising but are similar to those of Oymashya, lie at a great depth. [TASS] [Text] [Moscow PRAVDA in Russian 21 Jul 81 p 3] 11409

GROZNYY-BAKU OIL PIPELINE--Groznyy--Crude oil of the eastern regions has given Groznyy oil-refining enterprises their second wind. The Tikhoretsk-Groznyy oil pipeline, over which millions of tons of "black gold" flow from Tataria and Siberia in a continuous stream to the capital of Checheno-Ingushetia for refining has been in operation for more than a year. And what is to be done with Baku, where there is not enough oil for its own refineries? Transport it by rail? That is expensive, and the heavily loaded mainline that connects the country's Central Economic Region with Azerbaijan cannot cope with the stream of liquid fuel. It was decided, therefore, to build an oil pipeline from Groznyy to Baku. Economists consider that pumping the required amount of oil to Baku for the refineries will release an enormous number of railroad tank cars for the national economy's needs. And so in March of this year Groztruboprovodstroy [Groznyy Pipeline Construction Trust] builders and their colleagues from Novocherkassk, Krasnodar, Rostov and Dagestan went to work on the future pipeline route. More than 620 kilometers of the steel strand, which is 720 millimeters in diameter, are to be laid under extremely complicated geological conditions. Nevertheless, Groznyy's builders are facing their expected difficulties responsibly. The path of the pipeline route will cross a multitude of large and small streams, highways, canals, railroad tracks and unsurfaced country roads. Moreover, in order to provide for the reliable delivery of the crude to Baku, it is desirable to lay a second strand on the Groznyy-Tikhoretsk oil pipeline route 57 kilometers long, to connect the "tail" of this operating arterial with the "head" of the future line to Azerbaijan. [A. Samoylov] [Excerpts] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Aug 81 p 1] 11409

NEW KOMI OILFIELDS--Ukhta (Komi ASSR)--The collaboration of scientists, geophysicists and drillers has enabled oil recovery in the southern regions of the Komi ASSR to be increased. New deposits of raw materials are being introduced systematically into operation here. Prospects for discovering them were scientifically substantiated by Pechornipineft' [Pechora Scientific-Research and Design Institute for the Oil Industry]. The geophysicists checked the scientists' conclusions and confirmed them in practice. Exploration of two new fields has now been started, and preparatory work is being done at a third. Although the fields are not large, their operation is profitable. They were located alongside complexes for the recovery, transport and refining of the valuable raw material. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 15 Aug 81 p 1] 11409

'SIYANIYE SEVERA' GAS PIPELINE--Ukhta, Komi ASSR--Ukhtatransgaz [Ukhta Gas Transport Association] flow meters recently recorded this figure: 350 billion cubic meters. This much gas has been sent to the country's central region over the Siyaniye Severa pipeline system since the start of its operation. Two figures are indicative: while in 1970--the first year of the gas pipeline's operation--5 billion cubic meters of the blue fuel had been pumped from north to south, this year 75 billion cubic meters of Vuktyl' and Tyumen' gas will be sent over four gigantic steel stream beds of this underground river. More than 200 high-powered gas-pumping units are operating on the trunk pipeline to create the necessary pressure in the arterial pipelines. Total length of the pipelines being operated by Ukhtatransgaz exceeds 6,800 kilometers, and a large portion of them pass over regions with severe climatic conditions. Therefore, the gas-transport workers are paying much attention to raising the reliability and providing for emergency-free operation of the pipelines, monitoring and measuring instruments, and automated equipment. Having started competition under the slogan, "The economy should be economical," the association's collective saved in the first half of the year more than 38 million cubic meters of the gas that was consumed for in-house needs, as well as 34 tons of scarce turbine oil, 52,000 kilowatt-hours of electricity and 3,000 gigacalories of heat. [A. Kurkov] [Excerpts] [Moscow PRAVDA in Russian 14 Aug 81 p 1] 11409

ZHDANOV '3000' PIPELINE MILL--Zhdanov (Donetskaya Oblast)--Installation of the industrial equipment of the "3000" mill has started at the Metallurgical Plant imeni Il'ich. The unit will produce steel plate for making high-strength pipe for arterial trunk gas pipelines. The first line of the new department is intended to be introduced in 1983. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 30 Jul 81 p 1] 11409

HIGHER POWERED DRILL RIGS--Tyumen'--The recovery of crude oil at fields of the Tyumen' energy complex is being increased. Yesterday the 5-millionth meter of oil well since the start of the year was drilled here. Each day now the Siberians are sinking up to 15 wells toward productive deposits. The large-scale updating of drilling equipment has been telling. Enterprises of the Urals and Volgograd have assimilated the production of rigs of increased power. [TASS] [Excerpts] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Jul 81 p 1] 11409

MANGYSHLAK GAS-RECOVERY PROGRESSING--The collective of the Mangyshlak gas-recovery association, one of the oblast's leading collectives, is working on the state plan without interruption and has been meeting the socialist commitments that were adopted for the past two five-year plans. The gas recovery workers of our administration have had a good start also during the first year of the 11th Five-Year Plan. Inspired by the decisions of the 26th CPSU Congress and the 15th Congress of the Kazakhstan Communist Party, they exceeded during the first half of the year the socialist commitments adopted for 1981 for recovering natural gas and gas condensate. Since the start of the year more than 43 million cubic meters of gas and 10,000 tons of gas condensate above the plan have been recovered instead of the planned 25 million cubic meters and 8,000 tons. About 15 facilities in the administration have been automated. Remote control of gas-recovery processes at the Tenge field is being introduced. Inspired by production successes, wage workers, engineers and technicians of the Mangyshlak Gas-Recovery Administration have adopted increased socialist commitments: to recover 60 million cubic meters of gas and 11,000 tons of gas condensate above the plan by the 250th anniversary of the voluntary annexation of Kazakhstan to Russia. [B. Makhuov, secretary of the Party bureau of the Mangyshlak Gas-Recovery Association] [Excerpts] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 9 Aug 81 p 1] 11409

AZERBAIJAN OIL WELL INNOVATION--The mechanical damage to strings that are lowered into a well is not extreme if they are protected by the nipples that have been perfected by Baku petroleum engineers I. Prok, E. Manvelov, Ye. Kostychenko and R. Mamedzade. It is just as important for oilfield workers to see constantly to the preservation of their pipe as it is, let's say, for drivers to check their brakes. For the friction of the pump's moving parts on the string is great, even on good weather days, but if wind breaks out that deflects the rods from the vertical, the friction becomes so strong that the thin-walled steel pipe are destroyed in a few days. A small metal cylinder--a nipple that is easily attached to the string at the most vulnerable spots--solves the problem. At the NGDU [Oil and Gas Recovery Administration] imeni 26 Bakinskiye Komissary, an Azerinform correspondent was shown such a cylinder, which had just been extracted from a well. It looked more like a shell casing that had been saved from wartime. "And what if a pipe seems to have no nipple on it? Changing the cylinder," explained oilfield workers, "is a five-minute job, but it is not so easy to change the pipe." The Baku engineers' nipple allows many kilometers of pipe to be saved. [Text] [Baku VYSHKA in Russian 4 Aug 81 p 4] 11409

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DEVELOPMENT OF SIBERIAN MINERAL RESOURCES DISCUSSED

Quick Siberian Development Urged

Moscow LITERATURNAYA GAZETA in Russian No 1, Jan 81 p 10

[Interview with Academician A. A. Trofimuk, first vice chairman of the Siberian branch of the USSR Academy of Sciences, by Z. Ibragimova: "The Search at 30° Latitude"]

> [Text] What will Siberia give the country in the new five-year plan? How will this vast region east of the Urals be developed? The questions of our LITERATURNAYA GAZETA correspondent are answered by first vice chairman of the Siberian branch of the USSR Academy of Sciences Academician A. A. Trofimuk.

How Should We Handle Our Treasures

[Question] Andrey Alekseyevich, you have often stated that a geologist experiences a genuine feeling of satisfaction only when the riches which he has discovered are utilized, when they are used for the good of the Homeland. It would seem that Siberian geologists have nothing to complain about in this regard. Most of the new cities and settlements in the eastern and northern regions were created by the development of some mineral resource deposit or another, which has stepped up in recent decades. I recently had occasion to participate in an expedition of the Siberian Branch of the USSR Academy of Sciences in the Arctic. Among the members of the expedition was a geologist. Every time we arrived in some remote, uninhabited area at an industrial center under construction, (a center which already had its own airport and which was surrounded by roads and mounting stories of stone buildings above the vast expanses), our companion would state with unvarying pride: "All this began with the discovery of a deposit!" For the people in your profession, the eastern regions are a gratifying field of activity, aren't they?

[Answer] I understand and share the feelings of my colleagues. It is not for nothing that in the little-developed regions of the East and North geologists are called "employers." All hopes here are on development; all the economic perspectives are related to the results of geological prospecting. I don't want to repeat well-known examples, but I should recall a few figures, nonetheless. They speak better than words about the economic importance of geology and provide a clear understanding of Siberia's role in the country's national economic complex. The draft of the Central Committee of the CPSU for the 26th Party Congress states that in the 10th five-year plan the production of petroleum (including gas condensate) in Western Siberia increased by 2.1 times; that of gas, by 4.3 times. What does this mean? Every second ton and every third cubic meter of domestic petroleum and gas is today produced in Siberia!

It is Siberia which assures over 90 percent of the entire increase in fuel production; as for petroleum, it provides not only the entire nationwide increase but also is compensating for the reduction in output in other regions of the country. Today, it's almostimpossible to imagine our country's economy without the almost two billion tons of Siberian petroleum produced in the last three five-year plans.

Fortunately, not only were the oil and gas in Western Siberia discovered in time, but their extraction was organized very quickly. The history of our economy convincingly proves that the faster Siberian deposits are put into production, the higher the return on the resources expended for their prospecting and utilization. Besides the Tyumen oil and gas, one could also mention the copper and nickel ores of the Talnakh and Oktyabr deposits, the antimony of Yakutia and so on. Calculations and experience show that putting off the development of deposits is unprofitable. Therefore, our joy is mixed with bitterness. We are alarmed that the number of deposits in the eastern regions whose exploitation is being postponed is increasing. Naturally, this does not increase geologists' optimism.

[Question] How about the wealth discovered in the region of the Baikal-Amur Mainline? The Mainline is being built repidly and is to become the center of the economic development of a very large area of our country. In the opinion of Siberian economists and geologists, what should be developed first of all?

[Answer] First of all, deposits like the Molodyozhnoye (chrysotile-asbestos), Ozyernoye and Kholonenskoye (lead-zinc) and, of course, the Udokanskoye (copper) should be developed. I should mention that we are especially concerned with the situation regarding the famous Udokan. Year after year goes by, and as far as I know the technology for enriching the Udokan ore has not yet been perfected even experimentally. Meanwhile, the national economy is experiencing a noticeable need for copper.

Siberian scientists are also concerned about the future of the Gorevka lead and zinc deposit on the Angara. Gorevka was discovered about the same time as Talnakh, and the first conference on the development of these deposits was a joint one. But, whereas the efficient exploitation of Talnakh has resulted in an increase many times over in the metal output of the Norilsk plant, the long-suffering Gorevka ore still goes in small quantities across the entire country to the Caucasus--for experimental processing. The exploitation of the remarkable Gorevka, where lead is practically lying on the surface, was planned for the middle of the sixties. However, the plans of the Mid-Yenisei GES complicated this goal so much that departmental quarrels have been going on for over a decade now, and so far there is neither a Mid-Yenisei GES nor a Gorevka mining enrichment plant, whose engineering plan was accepted long ago with the evaluation "excellent." In our opinion, the necessity for the fastest possible development of the Gorevka deposit is obvious.

[Question] Perhaps it doesn't make sense to build the GES? At one time, the unwise Lower Ob GES project was canceled, since it threatened to flood a large area where there are now oil derricks...

[Answer] In this case, the scientists are proposing something different.

They are advising the engineers to hurry to choose the basic reserves before the flooding, and then switch to shaft mining. With shaft mining the water reservoir will not substantially affect the extraction results.

It also seems to Siberians that the extraction should be speeded up of a group of deposits containing raw materials for producing the mineral fertilizers so badly needed in Siberian fields. The geologists have stated their opinion here as well: it's up to industry.

Let me emphasize once again: an efficient involvement of resources in economic turnover involves doing so quickly. It is unprofitable to put off developing "treasures"--substantial wealth, on whose prospecting so much energy and resources have been spent.

Success Rewards Persistence

[Question] Andrey Alekseyevich, your optimistic estimates of the oil and gas bearing structures of Western and Eastern Siberia are well known. You have always shown an enviable faith in success, as early as the second Baku, for whose discovery you were awarded the title of Hero of Socialist Labor. When most people considered prospecting to be useless, you stubbornly insisted that it continue. And, when it depended directly on you, you would continue to search. Where does your optimism in estimating the possibilities of Siberian mineral resources come from? You are, of course, familiar with other views on the perspectives of the growth of Siberia's oil output; you know about the doubts concerning the ability of the natural system to meet the economy's growing needs?

[Answer] You see, my general belief is that there's no room in oil prospecting for a pessimist. One has to know how to extract useful information even from a failure, from a dry well, as pragmatists say, then apply the correction which your failure has given you to your subsequent actions.

I remember how many years ago, on one of our trips to Western Siberia, I accompanied the RSFSR minister of geology. We visited with pleasure the gas deposits already developed at that time, but then landed in an unknown area: an oil prospecting area. Upon learning that the prospectors hadn't yet obtained any results, the minister started to upbraid Salmanov, who was directing the work: "The state is spending millions on your wells, and nothing has come of it! Isn't it about time to slow down and cut back on the prospecting?!" I have to give Farman Kurbatovich credit: he defended his wells as best he could. I couldn't contain myself and hurried to help him out, justifying the temporary failure as the inevitable path to success, which would inevitably arrive, and very soon. We argued with the minister to take the risk and to continue the venture. Don't close down this work, and you'll be amply rewarded! Oil was discovered in Western Siberia about a year after this conversation.

Salmanov and I both were led by the faith inspired by science. I have to admit that I have believed in each of the wells which I have sunk in my lifetime. But, to be completely frank, I would have to make the following confession as well: out of a hundred cases, my optimism was confirmed in twenty. It is true that that was a good result in those days, during the war, since in the worldwide oil exploration process only ten wells out of a hundred justified their expectations. But at the same time, I couldn't help but think that such a success rate was a condemnation of the imperfection of science and our knowledge of the condition of the earth's mineral resources. Since that time, of course, science has made appreciable progress; better methods of forecast evaluation of territory have been developed. Science today enables us to know beforehand what we're casting for--a gudgeon or a pike, as one of my comrades puts it. As in the past, my optimism rests solely on scientific concepts. I will therefore answer you this way: science gives a high estimate of the possibilities for increasing oil output in Western Siberia. Scientists are increasingly convinced of Eastern Siberia's great wealth.

Science's duty to the petroleum industry is to create more effective systems of exploitation, ones which sharply increase the pool output coefficient without a large increase in the extraction process cost. Of great importance also is the development of new methods of oil and gas exploration, to which the Party's new program document, by the way, pays direct attention.

[Question] Does science have any ideas whose implementation would enable a revolutionary jump in geological prospecting? Can we look forward to a system of methods for direct discovery of hydrocarbon deposits?

[Answer] There are such ideas around. By this, I mean methods of seismic prospecting and electric prospecting combined with geochemical methods. Siberian geologists have achieved them experimentally. But this is large-scale work, requiring nationwide support. Further theoretical development is also needed, along with organizing an industry of new instrument building. However, the development and application of these methods will speed up and lower the cost of preparing reserves in the eastern and northern regions. If thirty wells out of a hundred today hit the target i.e. the deposit, then with direct methods probably seventy would be successful.

In brief, science justifies my belief in the high productivity of Siberian mineral resources. But in my opinion, the successful development of the petroleum industry is being hampered by certain substantial organizational shortcomings. Although I've already expressed my opinion about this, I want to speak again about what disturbs me. I am convinced that there is no clear delineation of responsibilities between the Ministry of Geology and the Ministry of the Petroleum Industry. The former is supposed to provide for the sector's long-term development. It has the capabilities and resources to search for new deposits and find them. But I am convinced that the responsibility for preparing industrial reserves should lie with the Ministry of the Petroleum Industry. This ministry can fulfill such responsibilities better, faster and cheaper than the Ministry of Geology, which is not in a position to handle this burden.

Why does the petroleum industry wait until geologists bring it new deposits on a silver platter? Why does it do so little itself to speed up the process of bringing natural resources to the commercial level, even though it has substantial capabilities? There is no satisfactory answer to these questions.

There are too many obstacles to the fast development of new oil deposits. In our opinion, a certain lack of management coordination and narrow bureaucratic attitude result in unnecessary work, a loss of time, and a decline in development rates.

The Struggle Against Space

[Question] Andrey Alekseyevich, the development of the sparsely settled eastern and northern regions raises a number of problems--economic, technical, and social. Special machines adapted to harsh conditions are needed. Light, portable construction structures are needed. More attention needs to be paid to resolving social questions. There needs to be.... In short, there are many problems. In your opinion, which of them should be considered the most important?

[Answer] I am convinced that the transport problem is of primary importance today. The classic expression "The development of Siberia is a struggle against the open spaces" remains just as appropos today as it was fifty years ago. After all, we are going to the East and the North even more resolutely now than then.

The gas industry will be developed rapidly, especially in the northern regions, where there are practically no roads. However, Siberia's transport development rate is generally low: less than one-fourth the average for the RSFSR, and nine to eleven times less than in the fully developed Central, Central Nonchernozem and Northern Caucasus regions. The growth rate of roads is lower in Siberia: notice that there is still no main east-west highway linking the Siberian regions with each other, as well as with the Urals and the European part of the country. Not to mention the North, the Arctic, where the population density is 0.1 to 0.2 persons per square kilometer!

But very large gas deposits have been discovered in the northern Western Siberian Plains, large enough to attract people to them, despite the remoteness, the lack of roads, the complexity of their development. The deposits are so rich that even given the difficult conditions it is possible to produce gas very efficiently at a good profit. However, in my opinion this circumstance makes transport the primary problem. I consider it my duty to state that the Salekhard-Urengoy railroad should immediately be made operational, with an extension to Norilsk. I consider this the most important task of the upcoming five-year plan.

Do we even need to discuss the necessity of all-weather roads?! To me, it's obvious. But I would also like to direct particular attention to the new types of air transport; in particular, to the combination of a helicopter with a dirigible, which is being studied in our country. These studies should be speeded up since, according to initial reports, they are yielding machines which are admirably suited for the East and North: reliable and maneuverable, with a high load capacity. Experts say that a modern helicopter expends 85 percent of its power keeping the machine in the air, and only 15 percent for the cargo which it was built to transport. But the same experts say that with a dirigible and helicopter combination the opposite is the case: 85 percent of the power goes to transport the payload, and only 15 percent goes for the flight itself.

[Question] Air-cushion vehicles have proven themselves well, yet large-scale industry still isn't genuinely interested in them.

[Answer] Yes. For now, it's all limited to the work of semi-amateur workshops. They create experimental models which prove themselves excellently and show a high efficiency, but the matter goes no farther than the experiment.

Land, water, air--all the paths leading to the earth's mineral wealth which our government is so interested in must be used with maximum efficiency.

[Question] So transport is a problem which is both central and comprehensive. Do you share the opinion of many Siberians that the entire country should aid the northern and eastern regions in resolving it? It sometimes seems to me that Siberians attach a special meaning to these words..

[Answer] Perhaps. The war years come to mind. The war found me in the Ural-Volga area, at the height of exploring the second Baku. We gave the front the best tractors--in general, all the best equipment we had. We had to fulfill our own strategic mission of giving the country a new oil supply with those resources which were unsuitable for the front: tractors in need of repair, essentially worn out pipes.... We were helped out a great deal then by the Baku and Grozny oilmen--everything needed for exploration and drilling was brought from the south. We were supported materially, and reinforced morally; we felt the support of the entire country.

I recall this on purpose. Today the times and scales are different. But in its peaceful offensive on the fronts of the five-year plan, as they say, the country is placing very great hopes on Siberia. And Siberia, in turn, has a right to count on the entire country's support in volving nationwide tasks. All Soviet people gain from this.

Rapid Siberian Exploitation Defended

Moscow LITERATURNAYA GAZETA in Russian No 29, Jul 81 p 10

[Article by Acadamician A. A. Trofimuk: "Reasoning Based on a Ruble? Our Descendants Won't Understand Us"; Academician A. A. Trofimuk Answers the Charges of Engineer A. Rogov]

> [Text] Addressing himself to Academician A. A. Trofimuk, a conversation with whom--"The Search at 30° Latitude"--was published in issue No 1 for 1981, LG reader A. Rogov, engineer from the Moscow region city of Kaliningrad, writes:
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> "In this interview, you expressed a very definite viewpoint which can not only be disputed, but in my opinion simply must be refuted. You complain about the insufficient scope of geological prospecting work and the slow development of fields already prospected: "Let me emphasize once again: an efficient involvement of resources in economic turnover involves doing so quickly." These are your words.
>
> But where are you leading us, using your authority as an academician? Yes, it's true that the riches of Siberia are great, but if we are guided by the aims you suggest, in the next few

> decades they could be reduced to ruin and a sad memory. Wouldn't it be better to leave a larger share of these riches to our successors? One would have to think that they could manage them better than us! How can prosperity be built on an ever more intensive consumption of unrenewable resources?
>
> According to your advice, we should pump out all the discovered oil as fast as possible. But oil (like other raw materials) is becoming more expensive every day, and many people in the world feel that it would be a good idea to hold on to it.
>
> Our scientists would be completely justified in suggesting that we increase the scale of extraction of oil from the earth if they could prove that oil is still continuing to be formed in commensurate amounts somewhere down there, in the depths of the earth. Without this, the recommendations of even the most authoritative scientists that we ravage our mineral resources are amoral...."
>
> The topic raised by the reader A. Rogov is of interest to many people. We acquainted Academician A. A. Trofimuk with this letter and asked him to respond to the reader. In a conversation with our LG correspondent, Andrey Alekseyevich stated:

This is not the first time that I have encountered the viewpoint whose defendants feel that in the interests of future generations we should sharply limit, or totally abandon, the utilization of nonrenewable natural resources, in particular, hydrocarbons. My position is directly the opposite. I am convinced that the intensive use of our fuel and energy resources is dictated by the social and economic interests of our government and our system. Let me try to explain what my position is based on.

At the beginning of the first five-year plan, our country was not producing much oil, something over 10 million tons. But oil was a critical necessity of the developing state. Without oil, it would have been impossible to solve the urgent tasks of power engineering, to run the machines and tractors which were indispensable in raising the country's industry and agriculture to a new level of development. Our oilmen at that time, primarily in Baku, accomplished a great feat: they fulfilled the five-year plan in two and a half years. As a result, by the end of the five-year plan the output of domestic oil almost doubled, reaching approximately 22 million tons.

Would any of their descendants, the children and grandchildren of the first Soviet oilmen, reproach them for an unwise management of our natural resources? On the contrary, the entire course of subsequent development proved the wisdom of such a decision. By becoming wealthier and technically better equipped, we were able to proceed to explorations in more remote areas; in particular, in the Ural-Volga area, and there found new pools. As you know, the Ural-Volga's development was done under the slogan: "Create a Second Baku!" But rather quickly--in the postwar period, in fact--the new region surpassed Baku in oil output volume by many times.

I shall recall another fact. In 1937, Academician I.M. Gubkin at the 17th International Geological Congress in Moscow delivered a report in which he defended a position which at that time was very audacious: our country possesses substantial supplies of oil which are still unexplored. Many scientists, especially the American ones, greeted Gubkin's statement with scepticism: where are there such reserves in Russia? Even America doesn't have as much as the Russian is talking about.

So what has happened? Since then, we have extracted much more from domestic depths than Ivan Mikhailovich foresaw at that time. As prospecting moved into new, little-known or unknown regions, new gas and oil bearing provinces were discovered, and the scale of the deposits expanded. Thanks to the Ural-Volga, the country was able to raise oil output approximately from 30 to 300 million tons. Further prospecting led us to Siberia. Without Western Siberia, without the Siberian deposits, we of course would not have reached last year's output level: 603 million tons of oil and gas condensate (312 of them from Siberia).

The country's present degree of industrial development can be determined from the level of energy consumption; in other words, the amount of organic fuel consumed. Whether we like it or not, organic fuel amounts to 90 percent of the raw material energy balance of any developed nation. According to some of those who share the opinion of the letter's author, using hydrocarbons as an energy source means "throwing them to the wind." But is this really the case? Imagine to yourself for just a minute that oil and gas were to disappear from human consumption. This would throw mankind back at least a century. And if today we refuse to use oil and gas as energy sources, we will drastically impede progress, for which our descendants will hardly thank us. Speaking figuratively: can we allow ourselves to starve to death if we are sitting on a sack of gold? Today, hydrocarbons are the bread of industry, and for what purpose should we refuse this bread by artificially delaying our own growth?

For the future? But it is exactly thoughts of the future, the perspectives of development of some of the most important scientific and technical directions, which lead to conclude the necessity for the timely involvement of hydrocarbon resources in economic turnover.

As in the past, as the scale of geological prospecting increases, ever new sources of hydrocarbon resources appear, and rather simple calculations show convincingly that, even at the rates at which the country intends to develop until the end of the century, we are exhausting a relatively small proportion of the possibilities granted us by nature. Prospecting still hasn't practically covered huge areas of the shelves, yet science knows already that they are no less rich than the land. And furthermore. It was recently believed that hydrocarbons are concentrated basically on the continents, and since they have been more or less thoroughly studied, the idea formed that there are rigid limitations on supplies of both liquid and gaseous hydrocarbons. But Soviet science has made a decisive correction to previous concepts: so-called solid gas has been discovered, in the form of gas hydrates. (This is methane and other gases which are held in water's crystal lattice.) Gas hydrates are a white powder deposited in the mud on the ocean floor. According to our calculations, the amount of gas hydrates in the bottom section of the seas and oceans exceeds by tens of times the calculated reserves of natural gas on land.

The category of supplies "for our descendants" should also include those hydrocarbons which we are presently forced to leave in thousands of deposits already worked or being exploited. Today, at the best deposits approximately 50 to 60 percent of the earth's contents is extracted. Much is being done to raise the proportion of oil extracted, but the current state of science and technology do not allow an economic solution to the problem. Frequently, extracting an additional two or three percent costs several times more than was needed for the first forty. But science and technology are not standing still. The time will undoubtedly come when mankind will learn how to quickly and economically extract the remaining oil still in the ground. Yet this "residue" ("more than half," it is said) can also be considered to be stored away and accurately counted.

In my view, the urgency of this problem lies not in the dilemma "To use, or not to use," but in raising the efficiency of hydrocarbons' use. It is true that hydrocarbons are presently used to produce a huge amount of the most varied and necessary products, but not more than 10 percent of everything that we produce is used for these purposes; the remainder goes for the needs of the power industry. The decisions of the 26th Party Congress orient the national economy in the eleventh and succeeding five-year plans towards a substantial reduction in the use of oil as an energy fuel (especially as furnace fuel oil), and towards replacement of oil by coal and gas, whose output will increase sharply. Fortunately, science is not marking time. Atomic power is acquiring an ever greater role in the national economy, and there is every reason to hope that our descendants will be smarter and more inventive than us; namely, that they will fundamentally change the ratio given above: 90 percent of the hydrocarbons will be used to produce valuable products, and only 10 percent will be utilized as an energy source.

Looking to the future, there is the mastery of thermonuclear energy, wind and tidal energy, geothermal energy, the discovery of methods to convert the thermal energy of the sun to electrical, and so forth. (LITERATURNAYA GAZETA, by the way, recently wrote about this.) It is also possible in the future to discover methods for producing hydrocarbons in the laboratory and then under industrial conditions.

All these circumstances enable us to look to the future with optimism. To refuse to use oil and gas today would truly mean a step backwards to the cave. To use them to strengthen the power of our nation and to solve the tasks involved in improving the people's well-being is both sensible and humane.

All of this gives me grounds to consider the reproaches and charges of Engineer A. Rogov to be completely unfounded.

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